This is a digital copy of a book that was preserved for generations on library shelves before it was carefully scanned by Google as part of a project to make the world's books discoverable online.

It has survived long enough for the copyright to expire and the book to enter the public domain. A public domain book is one that was never subject to copyright or whose legal copyright term has expired. Whether a book is in the public domain may vary country to country. Public domain books are our gateways to the past, representing a wealth of history, culture and knowledge that's often difficult to discover.

Marks, notations and other marginalia present in the original volume will appear in this file - a reminder of this book's long journey from the publisher to a library and finally to you.

Usage guidelines

Google is proud to partner with libraries to digitize public domain materials and make them widely accessible. Public domain books belong to the public and we are merely their custodians. Nevertheless, this work is expensive, so in order to keep providing this resource, we have taken steps to prevent abuse by commercial parties, including placing technical restrictions on automated querying.

We also ask that you:

+ *Make non-commercial use of the files* We designed Google Book Search for use by individuals, and we request that you use these files for personal, non-commercial purposes.

+ *Refrain from automated querying* Do not send automated queries of any sort to Google's system: If you are conducting research on machine translation, optical character recognition or other areas where access to a large amount of text is helpful, please contact us. We encourage the use of public domain materials for these purposes and may be able to help.

+ *Maintain attribution* The Google "watermark" you see on each file is essential for informing people about this project and helping them find additional materials through Google Book Search. Please do not remove it.

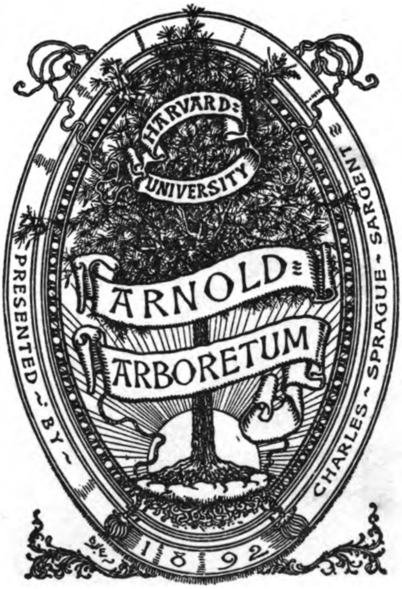
+ *Keep it legal* Whatever your use, remember that you are responsible for ensuring that what you are doing is legal. Do not assume that just because we believe a book is in the public domain for users in the United States, that the work is also in the public domain for users in other countries. Whether a book is still in copyright varies from country to country, and we can't offer guidance on whether any specific use of any specific book is allowed. Please do not assume that a book's appearance in Google Book Search means it can be used in any manner anywhere in the world. Copyright infringement liability can be quite severe.

About Google Book Search

Google's mission is to organize the world's information and to make it universally accessible and useful. Google Book Search helps readers discover the world's books while helping authors and publishers reach new audiences. You can search through the full text of this book on the web at `http://books.google.com/`

3 2044 106 437 460

Per.
U.S.
C
25



Anna Murray Vail
April 1892

Bot.

CONTRIBUTIONS

FROM THE

HERBARIUM OF COLUMBIA COLLEGE.

Columbia university — Department of botany.

VOL. 4.

[Nos. 76–100.]

1895-1896.

Afr. 1411
240.5

CONTENTS.

No. 76. The Biological Status of the Lichens. By Albert Schneider (1895).
No. 77. New or Noteworthy North American Phanerogams—IX. By N. L. Britton (1895).
No. 78. The Genus *Cenchrus* in North America. By George V. Nash (1895).
No. 79. Studies in the Botany of the Southeastern United States—IV. By John K. Small (1895).
No. 80. New or Noteworthy American Grasses—I. By Geo. V. Nash (1895).
No. 81. Contributions to American Bryology—XI. By Elizabeth G. Britton (1895).
No. 82. Some special phylogenetic Adaptations in Lichens—I. By Albert Schneider (1895).
No. 83. A Study of the Genus *Galactia* in North America. By Anna M. Vail (1895).
No. 84. New or Noteworthy American Grasses—II., III. By Geo. V. Nash (1895).
No. 85. Two New Genera of Saxifragaceae. By John K. Small (1896).
No. 86. *Carex vulpinoidea* Michx. and allied Species. By Eugene P. Bicknell (1896).
No. 87. A List of Species of the smaller Herbaceous Genera of North American Saxifragaceae. By Wm. E. Wheelock (1896).
No. 88. A neglected *Carex*. By Eugene P. Bicknell (1896).
No. 89. Notes on some Florida Plants—II. By Geo. V. Nash (1896).
No. 90. Studies in the Botany of the Southeastern United States—V. By John K. Small (1896).
No. 91. The Blue-Eyed Grasses of the Eastern United States (Genus *Sisyrinchium*). By Eugene P. Bicknell (1896).
No. 92. New or Noteworthy American Grasses—IV. By Geo. V. Nash (1896).
No. 93. *OEnothera* and its Segregates. By John K. Small (1896).
No. 94. A Preliminary Revision of the North American Isotheciaceae. By A. J. Grout (1896).
No. 95. Revision of the Genus *Asimina*. By Geo. V. Nash (1896).

CONTENTS.

No. 96. Notes on *Potentilla*—I., II. By P. A. Rydberg (1896).
No. 97. A neglected Species of *Oxalis* and its Relatives. By John K. Small (1896).
#No. 98. Studies in the Botany of the Southeastern United States—VI. By John K. Small (1896).
No. 99. Notes on *Potentilla*—III. By P. A. Rydberg (1896).
No. 100. On a new Species of *Scrophularia* hitherto confounded with *S. Marylandica*. By Eugene P. Bicknell (1896).

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE.—No. 76.

The Biological Status of Lichens.

BY ALBERT SCHNEIDER.

[Reprinted from the BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 22, No. 5, May 15, 1895.]

The Biological Status of Lichens.

By Albert Schneider.

For reasons to be enumerated, our present knowledge of lichens is very imperfect. Lack of attention is not the cause, as the voluminous literature on the subject will testify. The references, authentic and otherwise, number many thousands. It would be an endless task to bring together all the monographs, treatises, and especially the "fragments," referring to lichens. Lichenologists of ante-Schwendenerian time supposed that the question of the true nature of lichens and their position in the vegetable kingdom was permanently settled. Nothing was left for them to do but to issue "fragments" describing presumably new species and varieties. Collectors set to work in widely distributed and circumscribed areas to add their mite to the heap of confusion. We all know that the ultimate aim of science is to systematize; but no system can be formed from unknown material, whatever it may be. A scientist's first duty then is to study (*as far as possible*) his material before attempting to classify it. This careful studying of material is what the *mass* of lichenologists have heretofore failed to do. It is not my intention to enter into a historical review of lichenology, as that has already been thoroughly done by Krempelhuber and others. With the above introduction I shall now attempt to make somewhat clearer the present status of general lichenology.

The epoch-making researches of de Bary, Schwendener, Bornet and others have conclusively demonstrated the dual nature of the lichen structure; that is, it consists of a colorless hyphal portion homologous with certain filamentous fungi; and a green celled portion homologous with certain low forms of algae. The specific algal homologues have been pretty accurately studied out. Concerning the specific homologues of the fungal portion our knowledge is less accurate. But in regard to both symbionts we are certain of their originally independent ancestral forms. This theory of Bornet and Schwendener has from the very first met with strong opposition from nearly all lichenologists (taxonomists, so called). Even a considerable number of physiologists and morphologists misconstrued evident facts with unscientific perversity, notably Itzigsohn, Famintzin and Baranetzky. Even to this very day there are a number of lichenographers who persist in ignoring or directly opposing Schwendener's theory. This is simply additional evidence of the correctness of the statement "None are so blind as those who do not wish to see."

It would be useless to repeat the arguments based upon actual experimentation which conclusively prove the correctness of Schwendener's theory. There is, however, a question which Schwendener and his immediate followers have almost unanimously answered wrongly and that is the question of the true position of lichens in the vegetable kingdom. During the ante-Schwendenerian time, beginning with the earliest periods, most lichenologists looked upon lichens as autonomous structures, though this conclusion had no scientific basis founded on morphology and physiology. Their characteristic distribution and marked macroscopic appearance were thought sufficient to make them a distinct group. Schwendener assumed that lichens resembled certain groups of fungi, both in structure and in their manner of growth, and should therefore be classed under fungi as ascolichenes and basidiolichenes. It is much to be regretted that Schwendener did not see his mistake in time to avoid confusion and unnecessary and unwarranted opposition to his theory. I will frankly admit that I formerly thought it most expedient to classify lichens as modified fungi. But having since made a special study of lichen morphology, I now consider such a procedure both unscientific and impracticable. This idea is not original with me, nor do I stand as its only advocate. Many of the most recent scientific writers, notably Reinke, strongly uphold this view. I shall briefly consider lichens from the standpoints of morphology and physiology to show that they can only be treated as *autonomous structures having a phylogeny of their own.* I shall not consider it worth while to enter into word quibbling as to the meaning of "autonomy." If such were my desire I might well deduce good arguments to show that angiosperms are not autonomons, that they are simply modified gymnosperms, that gymnosperms are modified pteridophytes, pteridophytes modified mosses, etc., finally having it reduced to a primal cell; this cell could still be reduced to organic matter, and that to inorganic matter, etc. I shall consider as autonomous any comprehensive group of organisms having morphological and physiological characteristics differing from those of any other comprehensive group of organisms; meaning by comprehensive group any collection of allied individuals comprising natural species, genera and families. I will first show why lichens cannot be classed as fungi.

The method of reproduction in lichens is wholly different from that of fungi. It is true that lichen spores have a strong morphological resemblance to those of their probable homologues among the fungi. Functionally they differ widely. They cannot be considered specific reproductive organs of lichens as they formerly were of fungi, because they are not capable of developing into a complete mature lichen or even a fungus. They will indeed develop a mycelial network which will however not produce spores unless associated with its symbiotic alga. They can only be looked upon as *degenerate reproductive organs of their fungal ancestors.* This degeneracy is the more marked as we ascend the scale of lichen development. Taking one of the lower types, as exemplified in *Pyrenula*, we find spore organs having almost typical, fungal characters; that is, apothecia are prominent, paraphyses distinct and numerous, spore wall rather thick and colored, spores distinctly septate. These are the usual characters of fungal spore organs. Considering some of the higher types as exemplified in *Parmelia* and *Cladonia*, we find apothecia few or wholly wanting; when apothecia are present the asci are few in number, spore wall comparatively delicate and colorless, spores non-septate. There is no doubt that lichen spores still play a *part* in lichen reproduction. *This can however only take place when the spore with the specific algal symbionts are placed in a suitable environment.* That is, spores and algae must fall upon a spot where the algae can maintain existence independently until such time as the spores shall develop a mycelial network with haustoria with which to surround the algae, thus forming the beginning of a new lichen thallus. Should, for example, the spores with the requisite algae fall upon a dry rock. the algae would die, and if the spores should subsequently develop there would be no algae with which to form a lichen. From this it is evident that lichen spores must be very unreliable as *assistants* in lichen reproduction. From the very nature of things, lichen spores are not true reproductive organs of lichens, hence their tendency to degenerate.

The question whether lichen spores are sexual or asexual products is still unsettled. The observations of Stahl in the case of *Collema microphyllum* have not yet been verified. If his observations prove to be correct, then we may assume that lichen spores are sexual products. I am, however, strongly inclined to believe that Stahl's observations were probably erroneous. From numerous examinations of so-called "spermagonia," I believe them to be parasitic fungi, of which the "spermatia" are the spores. From a rather hasty comparative study it seems probable that their homologues are to be found in *Septoria* or allied genera. For example, *Septoria Speculariae* presents the general morphological appearance of spermagonia. The fact that we readily recognize *Septoria* as parasitic fungi lies only in the nature of things. In case of *Septoria* the morphological and physiological contrast between host and parasite is great, while in the case of spermagonia this contrast is only slight. No one would ever think of recognizing *Septoria Speculariae* as the male reproductive organs of *Specularia perfoliata*, upon which it lives. Such a suggestion would certainly be highly ridiculous. Then why should spermagonia of lichens be recognized as male reproductive organs, especially since no one has demonstrated that they play such a function? According to Wiesner, spermatia do develop a mycelium which finally produces spermagonia. From this the true nature of spermagonia may safely be conjectured. To say the least, it is certainly unreasonable to assume that spermatia will at one time function as non-sexual spores, and at another time as male sexual organs. Further investigations will reveal the true nature of things. The sooner this is accomplished the better, as many lichenologists have already made the deplorable mistake of considering spermagonia as important characters in lichen classification. To classify plants according to the characteristics of the parasites found upon them would certainly be a questionable procedure in modern taxonomy.

Other characteristics which distinguish lichens from fungi are the presence of various chemical compounds, notably lichenin, which is never found in fungi.

Characteristics which distinguish lichens from fungi also distinguish them from algae. There is certainly less similarity between an alga and a lichen than there is between a fungus and a lichen, though several attempts had been made to classify them as algae. In general it may be stated that lichens *resemble* algae only in so far as the algal symbiont resembles algae. The *differences* will be brought out in the discussion of those characters which separate lichens from both algae and fungi. For convenience sake I will separate these characters into morphological and physiological. These are the characters which fully establish the autonomy of lichens.

MORPHOLOGICAL.

Lichens, macroscopically considered, have such a peculiar appearance that the most superficial observer is naturally led to suppose that they form a group by themselves. They are found in places where neither alga nor fungus can exist alone. Especially peculiar is their ability to resist low temperatures. Freezing only checks their growth. A temperature of —40 ° C. does not kill them. Such crude observations are however not sufficient to establish their individualism.

The lichen thallus is of special interest to the morphologist since this structure is typically lichenological. It always consists of the hyphal and algal symbionts. The algal symbiont is usually more centrally located, being surrounded by the hyphae of the fungal symbiont. Three types of lichen thallus may be recognized, namely, the crustaceous, the foliaceous and the fruticulose. The crustaceous type is the most rudimentary and cannot be said to to have even a dorsiventral structure, though one would naturally expect this from the nature of things. The lower surface differs only in having more numerous extended hyphal filaments to enable it to adhere more firmly to the substratum as well as to take up soluble food materials. The second type already indicates a considerable advance in the evolution of the lichen thallus. It is typically dorsiventral. Dorsal and ventral layers are semi-cortical in structure; that is, the hyphal cells are closely united and have only few air passages. Between these two layers is a layer of loosely interwoven hyphal tissue in which are imbedded the algae. From the lower surface extend the rhizoids. On the upper are found the apothecia (with exceptions, example, *Nephromium*) and soredia, besides the so-called "spermagonia" and occasionally accidental fungal and algal parasites. The third type (as exemplified by the vertical thallus of *Cladonia* and *Thamnolia*) shows a typical radial structure. Numerous examples showing the gradual gradation from the dorsiventral to the radial type can be found. In the radial type there is an outer semi-cortical layer, which usually differs from that of the dorsiventral cortical layer in that it is more compact. The fungal cell walls have become somewhat gelatinized and adhere very closely. Next to this layer, on the inside, is the layer of loosely interwoven hyphae containing the algae. The third and innermost layer consists of longitudinal closely united hyphae. Sometimes this thallus is hollow in the center, sometimes solid, containing a central core of closely united longitudinal hyphae.

Soredia are also typical lichen structures. They are very numerous in the higher forms of lichens (example, *Parmelia sorediata*), and are found on the dorsal surface of the thallus, more frequently near the margin. Each soredium is in reality a miniature thallus. It is usually spherical in form, the outer layer consisting of closely united hyphal cells; the central portion consists of algal cells and loosely interwoven hyphal filaments. Soredia contain all the elements necessary for the development of a new lichen.

From what has been stated above, apothecia can not be looked upon as typical lichen structures, yet their morphology is of great importance in the consideration of lichen evolution and classification. Some of the changes in apothecia indicating a probable higher or lower stage of development have already been referred to. As I intend to consider these changes more particularly in a future paper on lichen classification, I shall at present omit further discussions. I shall now briefly consider the physiological characters which distinguish lichens from both fungi and algae.

PHYSIOLOGICAL.

In their method of growth lichens stand alone. The two symbionts form a microcosmos which is enabled to perform the necessary life functions which were originally inherent in both, and in addition they have acquired new characteristics during their phylogeny as lichens, which unmistakably stamp them as autonomous structures. As a unit they can now exist where neither symbiont could exist alone. In spite of this intimate mutualism, it is not at all likely that the fungal symbiont is *wholly* dependent upon the algal symbiont for its food supply. For example, a lichen spore may develop to a considerable extent as a saprophyte upon decaying wood, humus, and other dead organic matter; nor is it at all likely that a lichen can develop upon purely inorganic matter, as, for example, pure quartz crystals. Of course, the spore, with the requisite algae or a soredium, has bound up within itself a certain amount of extra food material, which enables development to begin in the absence of all organic matter. The mycelial network then forms a structure for collecting within its meshes organic substances, carried to it by air and water currents; this allows growth to continue. No amount of food supply will, however, allow the fungal symbiont to mature without its algal symbiont, excepting perhaps the lowest forms. Thus we see that mutualism of fungus and alga is necessary to form a lichen. The fungal symbiont, considered by itself, still retains its ancestral function as a saprophyte; in addition it has acquired the habits of a semi-obligative parasite upon its algal symbiont. The algal symbiont, which has the function of chlorophyll-bearing plants in general, that of assimilating carbon, must be looked upon as a facultative parasite, since it can exist and mature independently of its fungal symbiont. This has been repeatedly demonstrated experimentally. Considered as a unit, the fungal portion of the lichen supplies the algal with water, the necessary mineral substances, N., O. and H., from the underlying substratum and air. The algal symbiont as a result of this unusual supply of food materials, forms an extra amount of carbon and nitrogenous compounds, which is assimilated by the fungal symbiont. Thus it is seen that the benefit derived from this association is mutual. The term "mutualism," proposed by Tubeuf, is very appropriate and may well supplant the equally correct but more complex expression "mutualistic symbiosis," proposed by Frank.

Reproduction by means of soredia stands without a parallel in the vegetable kingdom. They are of course asexual, and are formed in the algal zone of the lichen thallus by the symbiotic association of algae and hyphae. They may be designated as mutualistic brood buds. They are really vegetative reproductive organs, and on that account the objection may be raised that they are not true reproductive organs. I shall not here enter into a discussion on the ultimate difinition of reproductive organs. The fact remains that *soredia alone contain the necessary elements for forming a new lichen.* There is no doubt that the great majority of lichens are reproduced from soredia; in fact, this is the only means of reproduction in some species. The outer semi-cortical hyphal layer of soredia enclosing the algae maintains a sufficient degree of moisture to enable them to lie dormant for a long period of time, or until conditions are suitable for their development. They are certainly far more reliable than spores (associated with the necessary algae) as reproductive organs. In fact, as Reinke has indicated, lichen reproduction by the aid of spores is in most respects similar to reproduction by means of soredia. In *Endocarpon pusillum*, for example, some of the algae are ejected and with the spore adhere to the mucilaginous spore wall, thus forming a sort of soredium in which the spore represents the fungal element. If the algae are not ejected with the spores, the chances for developing a new lichen must indeed be slight, for reasons already given.

In my opinion sufficient reasons have been given why lichens cannot be classed with fungi, much less with algae, and must therefore be considered as an independent group. Based upon morphological and physiological considerations this group would naturally belong midway between fungi and algae.

In conclusion I shall offer a few suggestions on the probable origin and phylogeny of lichens. There is little doubt that various subdivisions of lichens indicate a polyphyletic origin. Of this polyphylogeny either one or all of several forms may have occurred. For example, in ascolichenes, a certain fungal type may have (during its phylogenyas a lichen symbiont) become so modified by its symbiosis with a given algal type, as to enable it to associate with other algal species; or it may be that the same algal type became adapted to one or even several fungal types. As to what the conditions actually were we are at present scarcely able to say. Of one thing we are, however, certain and that is that a lichen is the result of the mutualistic association of a fungal and an algal type. Though in general I agree with Reinke as to the origin of lichens, yet I am not so ready to assume (theoretically) that *Collema* represents the oldest lichen type. *Collema* is the result of the symbiotic association of the alga *Nostoc* with some fungus whose ancestral type is not definitely known. The mass of the lichen structure consists of the alga. As compared with some other lichens the following are some of the reasons why *Collema* does not represent the lichen prototype: 1. The alga has undergone considerable change by way of adapting itself to new environments. Originally it was no doubt accustomed to a high degree of moisture (as is its present homologue, *Nostoc commune*), while in its present form as a lichen it is able to exist on tree trunks, rocks, etc., as most other lichens. 2. Its thallus shows a considerable degree of differentiation, as exemplified in the closely allied genera *Hydrothyrio*, *Polychidium*, *Leptogium* and *Mallotium*. 3. Spores have probably become considerably degenerated as indicated by their thin colorless walls, and in many cases indistinct septae. As a rule apothecia are few, though there are exceptions to this. 4. Soredia, though not numerous, are more frequently present than in many other lichen forms.

The above are the main reasons why Collema is perhaps not the prototype of lichens. In my opinion the true prototype of lichens is perhaps to be found in those structures which were formerly recognized as pseudo-lichenes. They may be observed on nearly every tree trunk, on fences, rocks, pavements, etc.; in fact, anywhere where the lower forms of algae (especially *Protococcus viridis*) can exist. Examination of these algae will find them usually associated with fungal hyphae, sometimes forming extended thin thallus-like layers. The structure formerly recognized as *Lepra viridis* is an excellent example. Though apothecia are never found, yet I am inclined to believe that in so-called *Lepra* we find the beginnings of a future lichen. At least there are many lichens which show an inferior structure as compared with *Collema*, and for that reason are perhaps nearer the prototype. As an example we may mention *Pyrenula*. *Verrucaria* perhaps represents a degenerate type rather than a lower type of an ascending series, as is indicated by a rudimentary thalline structure associated with rudimentary or degenerate apothecia, spores and paraphyses. Whether a given lichen represents a low type of an ascending series or a degenerate higher form is in many cases difficult to decide; also the question as to the relative phylogenetic ages of various lichen groups. There is perhaps little doubt that basidiolichenes have had a much shorter phylogenetic history than ascolichenes. There are many problems in lichenology which must be left to the conscientious morphologists and physiologists to solve. In fact, we know so little of the life history of individual lichens that the time for final specific arrangement has not yet come. We, however, know sufficient of lichens as a whole to give them a proper position in the vegetable kingdom which is in reality the first step toward establishing a lichen system. Their proper position I have attempted to indicate in this paper.

CONTRIBUTIONS FROM THE HERBARIUM OF COLUMBIA COLLEGE.—No. 77.

New or Noteworthy North American Phanerogams.--IX.

BY N. L. BRITTON.

[Reprinted from the BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 22, No. 5, May 15, 1895.]

New or noteworthy North American Phanerogams.—IX.

By N. L. Britton.

CAREX BAILEYI Britton, n. sp.

Carex tentaculata var. *gracilis* Boott, Ill. 94. 1860. Not *C. gracilis* R. Br.

Carex lurida var. *gracilis* Bailey, Mem. Torr. Club, 1: 11. 1889.

After observing this plant over a wide range of territory for several seasons, I have concluded to propose it as a species. I obtained crucial proof of its distinctness from *C. lurida* last autumn by finding the two growing side by side near Lake Placid, N. Y. I think the following description will readily identify it. It affords me much pleasure to associate the name of my friend, Prof. L. H. Bailey, with this very beautiful sedge.

Glabrous, culms erect or reclining, very slender, minutely scabrous above, 1°–2° long. Leaves slightly scabrous, elongated, 1″–2″ wide, the upper and the similar bracts exceeding the culm; staminate spike solitary, short-peduncled; pistillate spikes 1–3, narrowly cylindric, very densely many-flowered, all erect or ascending, 9″–2′ long, about 4″ in diameter, the upper sessile, the lower more or less stalked; perigynia inflated, ovoid, 2½″–3″ long, ascending, abruptly contracted into the subulate 2-toothed beak, prominently several-nerved, the lower about equalling, the upper longer than the linear-subulate ciliate-scabrous scale; stigmas 3.

In bogs, Vermont to Pennsylvania, Virginia and Tennessee along the mountains.

Another species has recently been distributed as *C. Baileyi* from the Herbarium of Harvard University, but no description of it has appeared, and I am informed by Dr. B. L. Robinson that it is probably *C. Raeana* Boott, in which conclusion I concur.

Carex Asa-Grayi hispidula (A. Gray) Bailey, Bull. Torr. Club, **20**: 427. 1893.

Carex Grayi var. *hispidula* A. Gray; Bailey, Mem. Torr. Club, **1**: 54. 1889.

The occurrence of trichomes on the perygynia in *Carex*, while a very strong character in some groups, is evidently a poor one in others. In the species under consideration it is so variable that it does not seem to me to warrant the separation of the proposed variety, especially as this does not appear to have other characters nor any well marked distribution as compared with the glabrous plant.

CAREX WALTERIANA Bailey, Bull. Torr. Club, **20**: 429. 1893.

This is another species whose perigynia vary from glabrous to quite densely pubescent. Professor Bailey has proposed (loc. cit.) a variety *brevis* for those with glabrous perigynia. I find the pubescence exceedingly variable; it is true, as he remarks, that the northern plants tend to have no pubescence, while the southern ones have a great deal, but I have New Jersey specimens in which the perigynia are hairy at the base and South Carolina specimens whose perigynia are very nearly glabrous. Under these circumstances I see no desirability of separating the northern plant as a variety.

CAREX BULLATA Schk. A form of this species with solitary long-stalked spreading pistillate spikes is collected by Mr. Lighthipe at Sand Hills, Middlesex Co., N. J. It was erroneously recorded in my Catalogue of Plants found in New Jersey as *C. Olneyi*, which, after an examination of several authentic specimens, I refer with confidence to *C. monile*.

CAREX HARTII Dewey Am. Journ. Sci. (II.) **41**: 226. 1866.

Carex retrorsa var. *Hartii* A. Gray, Man. Ed. 5, 600. 1867.

Examination of a considerable suite of specimens convinces me that this is a species distinct from *C. retrorsa*. I append a description:

Glabrous, culms very slender, smooth or very slightly scabrous above, erect or reclining, 1½°–2½° long. Leaves elongated, rough on the margins and lower side of the midvein, 2″–3″ wide, the upper and the similar bracts much overtopping the culm; staminate spikes 1 or 2, the lower sometimes pistillate at the base, borne on a stalk ½′–1′ long; pistillate spikes 2–4, scattered, rather loosely many-flowered, the upper sessile, the lower slender-stalked, 1′–2′ long, about ½′ thick, all erect or ascending; perigynia inflated, ovoid-conic, spreading or the lower somewhat reflexed, prominently few-nerved, about 3″ long, gradually tapering into the long 2-toothed beak, 2–3 times as long as the lanceolate acute or acuminate scale; stigmas 3.

In marshes, Ontario to central New York (and Pennsylvania?) west to Michigan.

Carex atratiformis Britton.

Carex ovata Rudge, Trans. Linn. Soc. 7: 96. *pl.* 9. 1804. Not Burm.

Carex atrata var. *ovata* Boott, Ill. 114. 1892.

This plant appears to me constantly different from the European *C. atrata;* I characterize it is as follows:

Glabrous, culms very slender, erect, sharp-angled, scabrous above, 8′–2° tall, leafy only below. Leaves smooth or but slightly scabrous, 1″–1½″ wide, rarely over 6′ long, much shorter than the culm; spikes 2–5, dense, oblong or oblong-cylindric, 4″–12″ long, about 2½″ in diameter, the terminal one usually staminate at the base and sessile or nearly so, the others filiform-stalked and drooping when mature; lower bracts ½′–1½′ long, very narrow, the upper ones subulate; perigynia flattened, ovate or nearly orbicular, puncticulate, ascending, about 1″ long, tipped with a very short minutely 2-toothed beak; scales reddish-brown, oblong, obtuse or subacute, slightly narrower than and about equalling the perigynia; stigmas 3.

Newfoundland to the mountains of New England, west to the Northwest Territory.

Carex stricta xerocarpa (S. H. Wright).

Carex xerocarpa S. H. Wright, Am. Journ. Sci. (II.) **42**: 334. 1866.

This appears to me to be a very well marked variety, if not a species distinct from *C. stricta* Lam. The pistillate spikes are almost filiform, loosely flowered and about 1″ in diameter. Besides original specimens collected in central New York by the describer of the species, I have it from Illinois, collected by J. Wolf.

Carex Haydeni Dewey, Am. Journ. Sci. (II.) **18**: 103. 1854.

Carex aperta Carey in A. Gray, Man. 547. 1848. Not Boott.

Carex stricta var. *decora* Bailey, Coult. Bot. Gaz. **13**: 85. 1888.

Professor Bailey has shown that the plant referred to *C. aperta* Boott, in the earlier editions of Gray's Manual, is not the same as the species of the Northwest to which the name was originally applied. I am confident that it is specifically distinct from *C. stricta.* I refer it to *C. Haydeni* with hesitation, although examination of an immature authentic specimen indicates that this name may be correctly applied to it. The species may be characterized as follows:

Glabrous, similar to *C. stricta* but smaller, culm slender, scabrous above, seldom over 2° high. Leaves 1″–1½″ wide, rough-margined, shorter than or sometimes overtopping the culm, their sheaths slightly or not at all fibrillose; lower bract foliaceous, about equalling the culm; staminate spikes linear-cylindric, 6″–15″ long, about 2″ in diameter, erect or somewhat spreading, all sessile or nearly so, sometimes with a few staminate flowers at the summit; perigynia orbicular, obtuse, about ½″ broad, faintly 2–4-nerved, minutely beaked, the orifice entire; scales lanceolate, purplish, spreading, very acute, about twice as long as the perigynia; stigmas 2.

In swamps, New Brunswick to Western Ontario, south to Rhode Island, Pennsylvania, Wisconsin and Nebraska.

CAREX COSTATA Schwein. Ann. Lyc. N. Y. 1: 67. 1824. Not Presl, 1819.

Carex virescens var. *costata* Dewey, Am. Journ. Sci. 9: 260. 1825.

My observations on this plant lead me to believe it constantly different from *C. virescens* Muhl. As the name applied to it by Schweinitz has been used before, I propose for it CAREX COSTELLATA and give its characters as follows:

Similar to *C. virescens* but taller and more spreading, culms slender, 1°–2½° long. Leaves 1½″–2″ wide, pubescent, especially on the sheaths, shorter than the culm, the upper one and the similar lower bract sometimes overtopping the spikes; spikes 2–5, narrowly cylindric, many-flowered, rather loose, ½′–1½′ long, 1½″ in diameter, erect or slightly spreading, the terminal one staminate below, the lower one commonly filiform-stalked; perigynia oblong, densely pubescent, narrowed at each end, strongly several-ribbed, 1″ long, rather more than ½″ thick, beakless, the orifice entire; scales ovate, scarious-margined, acuminate or cuspidate, shorter than the perigynia; stigmas 3.

In woods, Maine and Ontario to North Carolina, chiefly along the mountains.

ALLIONIA BUSHI n. sp. Low, glabrous, somewhat fleshy; stem nearly white, diffusely branched, about 8′ high, the branches slender, widely divergent; leaves narrowly linear, sessile, 1′–3′ long, 1″–1½″ wide, blunt, their width almost uniform from base to apex; involucres clustered at the ends of the branches, at first campanulate and longer than the flowers, at length rotate and becoming 10″ broad, membranaceous, pubescent, finely reticulate-veined, their 3 short lobes semi-circular, rounded, the mid-veins prominent.

In dry ground. Jackson county, Missouri. August, 1893. B. F. Bush.

Resembles *A. Bodini* (Holzinger) Morong, which is much more slender, its involucres short-pedicelled in the axils, the lobes ovate-oblong and acute.

RANUNCULUS ALLEGHENIENSIS n. sp.

Similar in aspect to *R. abortivus* and *R. micranthus*, glabrous, stem widely branched, 1°–2° tall. Radical leaves reniform or suborbicular, 6″–2′ wide, long-petioled, crenate or some of them lobed, the teeth and lobes subacute; stem leaves sessile or the lower petioled, divided nearly or quite to the base into linear acute entire toothed or cleft segments; flowers about 2″ broad; petals oblong, glandular, not exceeding the calyx; head of fruit sub-globose or oblong, 2″ in diameter; receptacle linear, about 2″ long, pubescent; achenes slightly compressed and margined, tipped with subulate hooked or recurved styles of about one-half their length.

Mountains of Virginia and North Carolina. April–May.

BRASSICA JUNCEA (L.) Cosson, Bull. Soc. Bot. France, **6**: 609. 1859.

Sinapis juncea L. Sp. Pl. 668. 1753.

Annual, glabrous, somewhat succulent, stem erect, usually stout, 2°–4° tall. Lower leaves runcinate-pinnatifid and dentate, long-petioled, 4′–6′ long, the uppermost sessile or nearly so, lanceolate or linear, commonly entire, much smaller; fruiting racemes sometimes 1° long; pods erect or nearly so on slender ascending pedicels, not appressed to the axis, 1′–2′ long, rather more than 1′ wide, the conic-subulate beak one-fourth to one-third the length of the body.

This plant has been sent to me from a number of points during the past three years and I have collected it twice myself. It seems to be fairly naturalized in some regions. As represented in the specimens examined, it is readily distinguished from *B. Sinapistrum* Boiss. by the total absence of the hispid pubescence of that species and by its erect longer and subulate-beaked pods.

In waste places, Southern New York and Pennsylvania to Michigan and Virginia. Adventive or naturalized from Asia. Also introduced into the West Indies and South America.

CHIMAPHILA Pursh. Additional proof of the non-publication of *Pseva* Raf., as an older name for this genus is to be found in Rafinesque's review of "A Manual of Botany for the Northern

States, compiled by the Editor of Richard's Botanical Dictionary," Albany, 1817. The author of this work is reported to have been Prof. Amos Eaton. Rafinesque's review is printed in the "American Monthly Magazine," 1: 426–430, September, 1817, where among his criticisms he remarks, "He (Eaton) has not adopted the good genera *Chimaphila* Pursh," etc.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE.—No. 78.

The Genus
Cenchrus in North America.

BY GEO. V. NASH.

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 22, No. 7, July, 1895.]

The Genus Cenchrus in North America.

By Geo. V. Nash.

Cenchrus is a small genus of grasses containing about a dozen species, found principally in tropical and sub-tropical regions. In the United States it extends into the temperate zone. One species, *C. tribuloides*, the common bur-grass, occurs frequently in sandy soil along river banks, and has a very wide distribution, extending from Massachusetts to Ontario, Minnesota and Nebraska, south to Mexico. It is also found in South America and in Cuba. The other species occurring in the United States are confined to the southern parts of the country, one, *C. echinatus*, extending as far north as North Carolina.

The genus in the United States is readily divided into two well-marked groups, the first containing those forms in which the involucre consists of two spine-bearing valves, more or less concealing and enclosing the 2–6 spicklets, as illustrated in the common *C. tribuloides*; the second has only one species, the involucre consisting of 2–4 rows of erect bristles, the outer shorter than the inner, the single spikelet merely surrounded by the bristles and not enclosed. The single species belonging to this group is *C. myosuroides*, which ranges from Georgia and Florida to Texas, and south through Mexico to South America, where it is very common.

Key to the Species.

- Involucre consisting of two spine-bearing valves, enclosing the 2–6 spikelets.
  - Involucre armed at base.
    - With shorter, generally reflexed spines; pedicels smooth; involucre 2 flowered.
      - Involucre globose, pubescent, 1. *C. tribuloides.*
      - Involucre ovate, smooth, 2. *C. gracillimus.*
    - With erect barbed bristles; pedicels villous; involucre 4–6 flowered. 3. *C. techinatus.*
  - Involucre naked at base, 4. *C. incertus.*
- Involucre consisting of 2–4 rows of erect slender spines and bristles, at the base of the single spikelet. 5. *C. myosuroides.*

1. Cenchrus tribuloides L. Sp. Pl. 1050. 1753.

C. Carolinianus Walt. Fl. Car. 79. 1788. Teste Pursh.

Stems erect or ascending, generally decumbent at base, robust, 2–6 dm. long, branching freely, sheaths generally strongly inflated, smooth, striate, compressed, the lower ones overlapping, the upper shorter than internodes, 3–8 cm. long; leaves 6–12 cm. long, 4–8 mm. wide, smooth or scabrous, flat or slightly complanate; spikes 3–6 cm. long, generally partially included in upper sheaths, densely 6–20-flowered; internodes of scabrous rachis 3–5 mm. long; involucre 2-flowered, globose, pubescent to villous, yellowish to light green in color, smooth at base, spines 3–4 mm. long, slightly to strongly ciliate at base, acutely barbulate at apex; spikelets 6–7 mm. long, generally not exserted beyond the involucre; 1st glume hyaline, triangular, acute, about one-half as long as spikelet, sparingly scabrous, strongly 1-nerved; 2d glume of firm texture, ovate, obtuse, about three-fourths as long as spikelet, scabrous, faintly 5-nerved at base, strongly so at apex; 3d glume firm, ovate, somewhat acute, about equaling spikelet, scabrous, 5-nerved; 4th glume chartaceous, broadly ovate, acuminate, 5–7 mm. long, scabrous at apex, 5-nerved; palet of first flower about as long as glume, 2-nerved, strongly scabrous between the nerves especially toward the apex, empty or enclosing 3 stamens; palet of perfect flower chartaceous, broadly ovate, slightly shorter than glume, faintly 2-nerved, scabrous toward the apex; seed oblong-obovate, 3 mm. long, 2–2.5 mm. broad, compressed.

Extensively distributed in the United States ranging from Massachusetts to Ontario, Minnesota and Nebraska, south to Florida and Mexico. Extremely variable, but its robust habit, generally strongly inflated sheaths and light colored globose involucres will distinguish it from its nearest relatives.

2. CENCHRUS GRACILLIMUS n. sp.

Stems ascending or erect, 3–6 dm. high, simple or occasionally sparingly branched above, slender; sheaths smooth, striate, the lower overlapping, the upper shorter than internodes, 6–7 cm. long, but slightly inflated; leaves complanate, 5–8 cm. long, about 2 mm. broad, acuminate, scabrous on margins and midnerve; spike finally long-exserted, 3–5 cm. long, loosely 3–6 flowered, internodes of scabrous rachis about 1 cm. long; involucre 2-flowered, smooth, ovate, purplish, deeply furrowed and smooth at base; spines purple, 5–6 mm. long, 1 mm. broad at base where they are sometimes ciliate, acutely barbulate at the apex; spikelets about 8 mm. long, exserted beyond involucre for one-third to one-half their length; 1st glume triangular, hyaline, acute, one-half as long as spikelet, strongly 1-nerved, slightly scabrous; 2d glume firm, ovate, acute, 7-nerved, scabrous; 3d glume of firm texture, ovate-lanceolate, acuminate, slightly shorter than spikelet, 5-nerved, scabrous especially toward apex; 4th glume chartaceous, 7–8 mm. long, ovate-lanceolate, long-acuminate, strongly 5-nerved at apex, scabrous for upper half; palet of first flower equaling glume, strongly scabrous, 2-nerved, empty or enclosing three stamens; palet of perfect flower ovate, long-acuminate, chartaceous, a little shorter than glume, 2-nerved, strongly scabrous toward apex; seed oblong, 2.5 mm. long, 1.5 mm. broad.

Florida, occurring in the high pine land, together with *C. tribuloides* and *C. echinatus*, flowering a little earlier than the former and later than the latter. It is readily distinguishable from either, especially when growing in the field, by its long slender purple spines, smooth involucre, very slender habit and closely complanate leaves. Begins to flower early in April. My Nos. 188 and 288, collection of 1894.

3. CENCHRUS ECHINATUS L. Sp. Pl. 1050. 1753.

Stems creeping, erect, 3–6 dm. long, branching; sheaths smooth, striate, inflated, lower ones overlapping, upper shorter than internodes, 8–12 cm. long; leaves 1–4 dm. long, 5–15 mm. wide, smooth or scabrous, flat; spikes 4–12 cm. long, finally more or less exserted, very densely 20–50 flowered, internodes of the scabrous rachis 2–3 mm. long; involucre 4–6 flowered, globose, green to purplish, more or less pubescent, villous at base; spines 3–4 mm. long, barbulate at apex, more or less ciliate at base; bristles at base of involucre numerous, slender, distinctly barbed for their whole length; spikelets 6–7 mm. long, more or less exserted from involucre; 1st glume hyaline, lanceolate, obtuse or acute, one-half as long as spikelet, strongly 1-nerved, sparingly scabrous at apex; 2d glume firm, ovate, obtuse, three-fourths as long as spikelet, 5-nerved, scabrous; 3d glume firm, ovate-lanceolate, acuminate, slightly exceeded by fourth glume, 5-nerved, scabrous; 4th glume chartaceous, ovate-lanceolate, acuminate, 6–7 mm. long, 5-nerved, scabrous at apex; palet of first flower about as long as glume, 2-nerved, strongly scabrous; palet of perfect flower as long as glume, chartaceous, ovate-lanceolate, faintly 2-nerved; seed obovate to elliptical, 2.5 mm. long, 1.5 mm. wide, compressed.

This plant is well marked by its broad flat leaves, and the slender barbed bristles surrounding the base of the involucre, which contains double the number of spikelets found in the other species.

North Carolina to Texas, along the coast.

4. CENCHRUS INCERTUS M. A. Curtis, Bost. Journ. Nat. Hist. 1: 135. 1837.

Stems erect or decumbent at base when young, finally creeping, 3–6 dm. long, smooth; sheaths smooth, inflated, compressed, striate, lower ones more or less overlapping, upper shorter than internodes, 5–9 cm. long; leaves smooth, flat, 4–15 cm. long, 3–5 mm. wide; spike generally exserted, 3–6 cm. long, 8–20-flowered, internodes of the scabrous rachis 2–5 mm. long; involucre 2-flowered, pubescent, ovoid, smooth at base; spines about 3 mm. long, very broad at base, ciliate; spikelets 5 mm. long, more or less exserted from involucre; 1st glume hyaline, triangular, acute, strongly 1-nerved, one-half as long as spikelet; 2d glume of firm texture, ovate, obtuse, about three-fourths as long as spikelet, 5–7-nerved, scabrous; 3d glume ovate, acute, 5-nerved, somewhat shorter than fourth glume, scabrous; 4th glume chartaceous, broadly ovate, acute, about 5 mm. long, strongly 5-nerved and scabrous at apex; palet of first flower about equaling glume, strongly scabrous, 2-nerved, empty or enclosing three stamens; palet of perfect flower chartaceous, ovate, acute, about equaling glume, scabrous at apex; seed oval, 2 mm. long, 1.5 mm. broad.

Ranges from South Carolina to Florida and Texas. The smaller involucre, naked at base, with fewer and shorter spines, readily distinguish this plant from *C. tribuloides* which it somewhat resembles.

5. CENCHRUS MYOSUROIDES H. B. K. Nov. Gen. 1: 115. 1815.
Panicum cenchroides Ell. Bot. S. C. and Ga. 1: 111. 1817.

Perennial from a running rootstock. Stems 6–14 dm. high, simple, or branched above, terete, smooth; sheaths somewhat inflated, 7–14 cm. long, striate; leaves smooth, 1–3 dm. long, 3–8 mm. wide; spikes included in upper sheath, or more or less exserted, densely many-flowered, 5–20 cm. long, internodes of the scabrous rachis 2–5 mm. long; involucre consisting of 1–2 rows of barbed spines as long as the spikelet, subtended by 1–2 rows of barbed bristles one-fourth to one-half as long; spikelet about 5 mm. long, resting on the involucre and equaling its spines; glumes all more less short-pointed by the excurrent midnerve; 1st glume hyaline, triangular, acute, about one-half as long as spikelet, 1-nerved; 2d glume firm, ovate, acute, about three-fourths as long as spikelet, 5-nerved, sparingly scabrous; 3d glume as long as the fourth, firm, ovate, acute, strongly 5-nerved at apex; 4th glume chartaceous, ovate, acute, 5 mm. long, 5-nerved at apex; palet of first flower from one-quarter to one-half as long as glume; palet of perfect flower equaling glume, strongly 2-nerved and scabrous at apex.

Ranges from Georgia (Elliott) to South Florida, western Texas and Mexico.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE.—No. 79.

Studies in the Botany
—OF THE—
Southeastern United States.--IV.

BY JOHN K. SMALL.

(PLATE 246.)

[Reprinted from The Bulletin of the Torrey Botanical Club, Vol. 22, No. 7, August, 1895.]

Studies in the Botany of the Southeastern United States.—IV.

By John K. Small.

(Plate 246.)

Sieglingia Chapmani n. sp.

Wiry, slender, glabrous (except the tops of sheaths and parts of the inflorescence), bright-green, perennial by a horizontal rootstock. Culms solitary or two or three together, erect, strict, 9–15 dm. tall, mostly purple about the nodes; lower leaves rather numerous, nearly erect, 4–6 dm. long, the upper few, divaricate, somewhat shorter, all firm, flat when young, soon involute and almost filiform, 7–11-ribbed, smooth and glabrous; lower sheaths about 1 dm. long, upper ones often 2 dm. long, all ⅓–½ shorter than the internodes; ligule a short fringe of rigid villous hairs, above which, on the upper surface of the leaf, is a tuft of longer villous hairs; panicle averaging about 2 dm. high, viscid above, broadly ovoid, its branches rigid, filiform, divaricate (not drooping at the ends), the nodes tufted with bunches of silvery-villous more or less viscid hairs; spikelets very slender-pedicelled, rather few 7–8 mm. long, tinged with purple, almost linear (when dry oblong) 5-flowered; empty glumes lanceolate, one-nerved, the lower one ¾ longer than the upper; flowering glumes oblong-elliptic, 3-nerved, 3-pointed by the excurrent nerves which are villous for ½ their length; palet 2-nerved, scabrous on the two nerves, slightly curved.

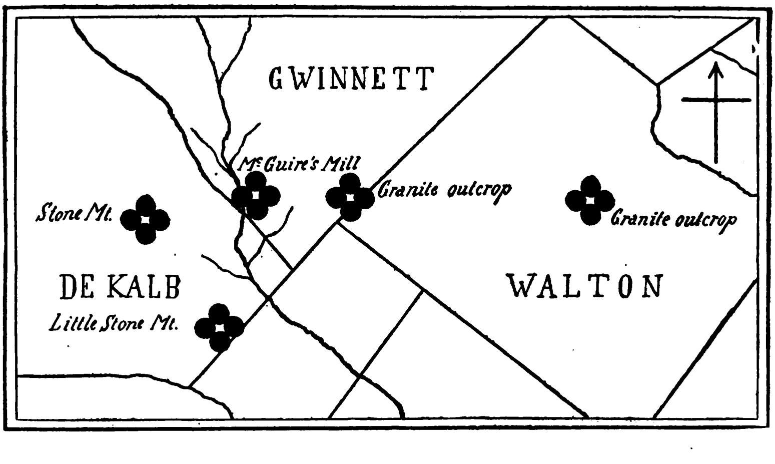
A species of southern distribution separable from *Sieglingia seslerioides* by its more slender and wiry habit, the very slender and diverging branches of the panicle and the usually conspicuous tufts of viscid hairs at the nodes throughout the panicle.

I found it last season growing in sand on the slopes of Currahee Mountain, near Toccoa, Georgia, and along the Yellow River, Gwinnett County, in the same State. Its range may be given as follows: Georgia, as just cited, to Texas: J. Reverchon; Bigelow, Camp No. 4, between Ft. Smith and the Rio Grande, south to Florida: Chapman, Curtiss (3454) Duval County.

Quercus Georgiana M. A. Curtis; Chapm. Fl. S. States, 422 (1860). Although heretofore supposed to be confined to a single station and to exist only in shrub form, *Q. Georgiana* is now known to have a considerable range and also to reach a development which allows it to be classed as a tree.

Stone Mountain, Georgia, is the original locality of this species. There it is more plentiful than at any of the new stations, but seldom attains the form of a tree. During the last two years I have found this interesting oak at four new places, and at all of these it grows plentifully and the tree form predominates instead of the shrub.

Along the Yellow River, about six or seven miles east of Stone Mountain, there are several large groves on the sides of the cañons where the granite rocks outcrop. Six or seven miles east of the Yellow River there occurs another outcrop of granite, and here two fine trees stand and bear fruit in great abundance. Travelling between the last mentioned station and the Oconee Mountain, a little to the south of east, I came upon another granite outcrop just west of the Oconee River. There the species again appears, and it is interesting to note that whenever found it is confined to granite outcrops. A fifth, or fourth, new locality is Little Stone Mountain, situated about nine miles south of Stone Mountain. There the species reaches its greatest development in size, measurements showing a height varying from twenty to thirty feet and a maximum trunk diameter of fourteen inches. The following map will give an idea of the geographic distribution of this oak.



PHORADENDRON FLAVESCENS (Pursh) Nutt.; A. Gray, Man. Ed. 2, 383. 1856.

This plant is quite plentiful in the vicinity of Stone Mountain, Georgia. At all the places where I found it in that region its host was *Quercus Georgiana*, although there were numerous other deciduous-leaved trees growing with the latter species.

RUMEX FASCICULARIS n. sp.

Perennial by a cluster of fusiform tuberous roots, glabrous, of a dull, rather dark or olive-green color. Roots in clusters of from 3–5, 5–10 cm. long; stem lax and weak, 5–6 dm. long, decumbent and ascending, strongly grooved, abruptly thickened at the base and slightly thickened at the nodes; internodes 1–6 cm. long; leaves mostly oblong, occasionally a few oblong-ovate or ovate, 7–17 cm. long, 4–7 cm. broad, of much the same size throughout and clustered at the shortened end of the stem near the inflorescence, acute or obtuse, somewhat undulate and crisped, mostly truncate or cordate at the base, sometimes obtuse, thick (drying very thin), petioled; petioles stout, 3–7 cm. long, strongly dilated at their bases; ocreae thin and brittle, fugacious; panicle 12–16 cm. long, rather dense in fruit; racemes ascending, 1–5 cm. long; pedicels slender, narrowly clavate, winged at the summit, deflexed in fruit, 1–2 cm. long, articulated at the base; wings of the calyx broadly deltoid, 4 mm. long, 5 mm. broad, undulate, strongly nerved, each bearing an ovoid rugose callosity: style-segments reflexed on the angles of the achene; achene broadly pyramidal-ovoid, triquetrous, 2 mm. long, chestnut-colored, smooth and shining, the faces concave, the angles slightly margined. Plate 246.

A peculiar and striking species on account of its clustered leaves. The shape of the latter is different from that of any other North American member of the genus. By its inflorescence, wings and achene it is related to *R. Floridanus* and *R. verticillatus*, but the achene is broader and shorter than that of either of those two species. The stem is unable to support the weight of the leaves and inflorescence and bends over, endeavoring to rise again at the end.

The specimens were collected by Mr. Geo. V. Nash, on his recent excursion to Florida, in cypress swamps, on the marshy shore of Lake Harris, near Eldorado, in the central part of the peninsula.

ACER LEUCODERME n. sp.

Acer Floridanum acuminatum Trel.

A shrub, or small tree reaching a height of eight meters and a trunk diameter of from one to five dm., clothed with a smooth white bark. Trunk very short, sometimes almost wanting; branches (secondary trunks), two to eight together, erect or ascending, conspicuous by their white bark; branchlets clothed with a gray or reddish bark; leaves depressed-orbicular (*i. e.*, broader than high), or rarely orbicular in outline, mostly three-lobed, sometimes imperfectly five-lobed, 4–9 cm. in diameter, cordate or truncate, petioled, with a rather open and shallow sinus, dark green, glabrous and marked with light nerves above, greenish, tinged with red, prominently nerved and very velvety (to the touch) beneath, the lobes acute or acuminate (the 4th or 5th when present obtuse), each (or the terminal one only) bearing two obtuse teeth; petiole slender, reddish, 3–6 cm. long; flowers not seen; wings of the samaras oblong-spatulate, 1–2 cm. long, red, conspicuous, parallel or nearly so (more or less spreading when the fruits separate at maturity); seed oblong, its covering prominently veined.

A very handsome maple, characteristic on account of its habit of branching near the base into from several to many secondary trunks, and the white bark. The bright green color of its foliage and the usually bright red fruit render it conspicuous, and while the velvety pubescence on the lower surfaces of the leaves is not prominent it is remarkably soft and dense to the touch.

As far as I have observed, the tree is confined to the bottoms of two rocky cañons, that of the Yadkin River, in Stanley county, North Carolina, and especially that of the Yellow River, in Guinnett county, Georgia. Dr. Trelease has reported the tree from further south, where it doubtless occurs, but I do not know the character of the localities.

KOELLIA VERTICILLATA (Michx.) Kuntze, Rev. Gen. Pl. 520. 1891.

Pycnanthemum Torreyi Benth. Lab. Gen. & Sp. 329. 1834.

This species of Koellia has never been recorded as growing further south than Southwestern Virginia,* and consequently it has not been credited to the Southern Flora. In August, 1893, I found the plant growing in Northern Georgia, in Rabun county, near Estotoah Falls. It was quite plentiful in the valleys and ravines, at about 2000 feet altitude and inhabited localities much like those in which it was found in Southwestern Virginia.

SOLIDAGO YADKINENSIS (Porter).

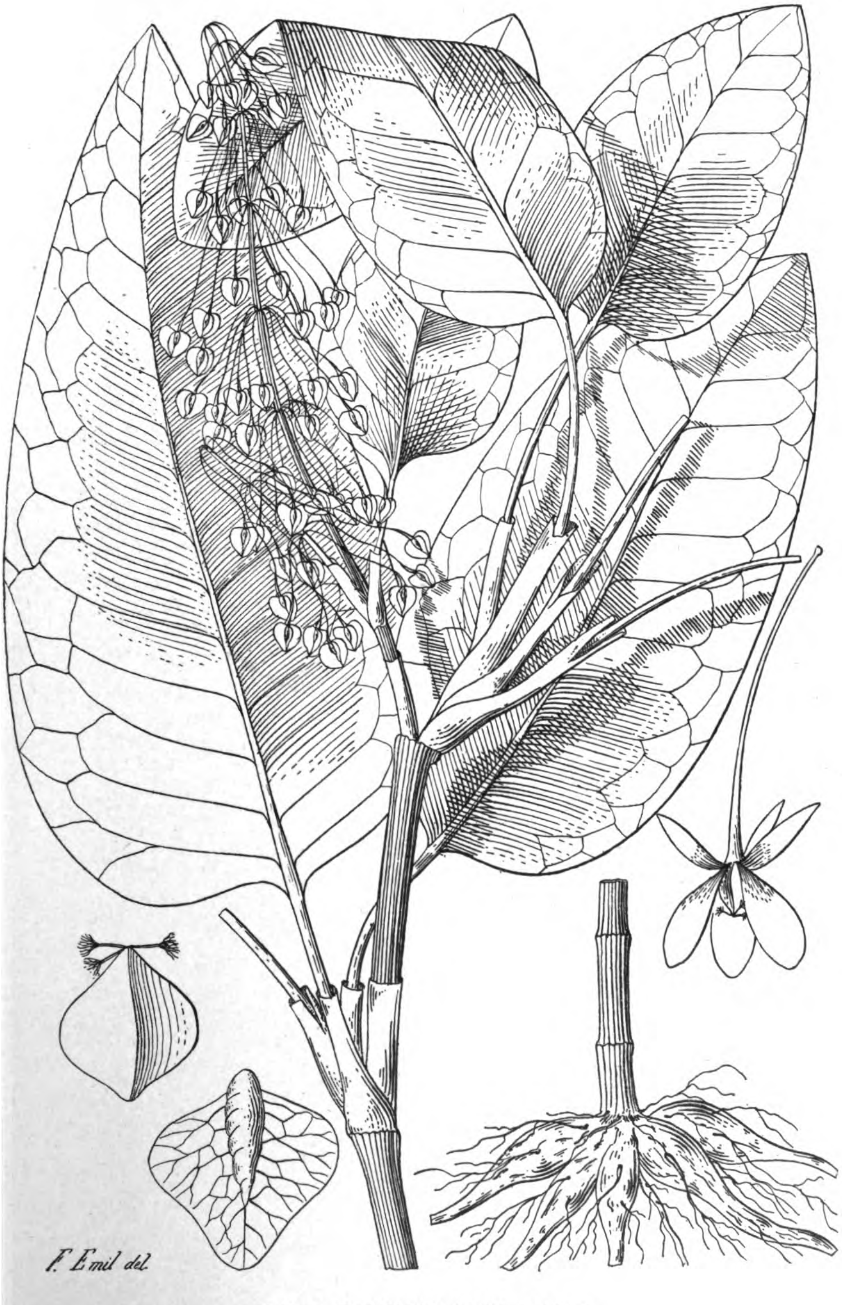
Solidago Boottii var. *Yadkinensis* Porter, Bull. Torr. Club. 1892.

Perennial, slender, wand-like, glabrous and of an olive-green color throughout. Rootstock long, chaffy, horizontal; stem 5–15 dm. long, erect, simple below the inflorescence; basal leaves tufted, lanceolate or linear-lanceolete, the blade 10–30 cm. long, acute at the apex, acuminate at the base, the petiole 6–15 cm. long, winged; cauline leaves lanceolate, linear-lanceolate or linear-oblong, 3–15 cm. long, erect and appressed, acute at the apex, sessile, the lower ones like the basal, serrate with a few distant appressed or spreading teeth; inflorescence consisting of a simple terminal secund raceme or thyrse; heads campanulate, stalked, 3–4 mm. high, 25–35 flowered; involucral bracts in four to five series, oblong or linear-oblong, 1–2 mm. long, ciliate, obtuse, with a dark-green midrib and tip; corolla slightly longer than the pappus, more or less pubescent; rays yellow, oblong-spatulate, entire, 2–3-apiculate; achene columnar, obtuse at the base, 10–14-ribbed, pubescent with a few spreading hairs.

---

* Mem. Torr. Club, 4:146.

This species was first described as a variety of *Solidago Boottii* by Prof. Porter, from collections made by Mr. Heller and myself in middle North Carolina in 1891. On first meeting with the plant it seemed to me a good species, and field observations on it each succeeding season have convinced me of its specific validity. It grows only in rather open meadows scattered through the pine woods. The first specimens seen were of the simple type (*i. e.*, in which the inflorescence consisted of a simple terminal raceme) and not over six dm. tall. They were found near Gold Hill, N. C. Last season I found this type near the base of Dunn's Mountain, in the vicinity of Salisbury, N. C. However, a more robust and branched form is the more common state, and this occurs at many localities in middle North Carolina. Up to last season *Solidago Yadkinensis* was not known to grow outside the last mentioned region, but in September (1894) I met the plant growing luxuriently at two stations in middle Georgia; the one a botanically prolific meadow near Loganville, Walton county, and the other meadows near the base of Little Stone Mountain, DeKalb county. The Georgia specimens are a little more robust than those from North Carolina, but otherwise they are almost identical. The variation that does exist is due to the less exposed conditions under which the Georgia plants grew.



RUMEX FASCICULARIS SMALL.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE.—No. 80.

New or Noteworthy American Grasses.—I.

BY GEO. V. NASH.

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 22, No. 10, Oct., 1895.]

New or noteworthy American Grasses.—I.

By Geo. V. Nash.

Erianthus compactus n. sp. Culm erect, 4°–8° tall, stout, its nodes barbed, its summit and the axis of the panicle densely pubescent with appressed long rigid silky hairs. Sheaths glabrous or pubescent at the apex; leaves scabrous above, sparingly appressed-pubescent beneath, 6′–2° long, 3″–6″ wide, long-acuminate, narrowed toward the base; panicle narrowly oblong, 4′–6′ in length, about 1½′ wide, branches erect, 1′–2′ long; spikelets crowded, the internodes of the rachis about 1″ long; outer scales of the spikelet about 2½″ long, exceeding the pedicels and about equalling the basal hairs, lanceolate, acuminate, pubescent with long spreading hairs; inner scales shorter, the awn 5′–10″ long, straight, scabrous.

In moist or wet soil, New Jersey to North Carolina and Tennessee. The compact panicle composed of short erect branches, the short internodes of the rachis, and the crowded small spikelets readily distinguish this plant from the other straight-awned species.

SYNTHERISMA Walt. Fl. Car. 76 (1788).

[*Digitaria* Scop. Fl. Carn. Ed. 2, 1: 52. 1772. Not Heist. 1763].

The Digitaria section of *Panicum* is certainly sufficiently distinct to take generic rank and it has been so regarded by many authors. *Panicum* as now generally understood comprises too many forms. It would seem preferable to restrict the genus to the Eupanieae.

The name *Digitaria* was originally applied by Heister (Adans. Fam. Pl. 2: 38. 1763), to the *Tripsacum* of Linnaeus, and antedates by nine years the *Digitaria* of Scopoli (Fl. Carn. Ed. 2, 1: 52. 1772), who applied it to a group of plants that have since been considered by many as only a section of *Panicum*. This name is therefore a synonym of *Tripsacum* and not available. The oldest available name appears to be *Syntherisma* of Walter. A partial sysonymy of the three species occurring in the north-eastern United States would be as follows:

1. SYNTHERISMA SANGUINALIS (L.).
   Panicum sanguinale L. Sp. Pl. 57. 1753.
   Digitaria sanguinalis Scop. Fl. Carn. Ed. 2, 1: 52. 1772.
   Syntherisma praecox Walt. Fl. Car. 76. 1788.
   Paspalum sanguinale Lam. Tabl. Encycl. 1: 176. 1791.
2. SYNTHERISMA LINEARIS (Krock.).
   Panicum lineare Krock. Fl. Sil. 1: 95. 1787.
   Syntherisma serotina Walt. Fl. Car. 76. 1788.
   Digitaria humifusa Pers. Syn. 1: 85. 1805.
   Syntherisma glabra Schrad. Fl. Germ. 1: 163. 1806.
   Panicum glabrum Gaud. Agrost. 1: 22. 1811.
3. SYNTHERISMA FILIFORMIS (L.).
   Panicum filiforme L. Sp. Pl. 57. 1753.
   Paspalum filiforme Sw. Prodr. 22. 1788.
   Syntherisma villosa Walt. Fl. Car. 74. 1788.
   Digitaria filiformis Muhl. Gram. 131. 1817.

PANICUM PORTERIANUM nom. n.

Panicum latifolium Walt. Fl. Car. 73. 1788. Not Linnæus, 1753.

Panicum Walteri Poir. in Lam. Encycl. Suppl. 4: 282. 1816. Not Pursh, 1814.

Panicum latifolium var. *molle* Vasey, Bull. Bot. Div., U. S. Dept. of Agric. 8: 33. 1889.

Search has failed to disclose an available published name for this plant. The Linnaean name belongs to a tropical species. The *P. Walteri* of Poiret is antedated by two years by Pursh's name which was applied to an entirely different plant, the *P. Crus-galli* var. *hispidum* of Torrey. The varietal name of Vasey has already been used. It is necessary, therefore, to give this well-known plant a name, and the above is proposed in honor of Prof. Thos. C. Porter.

PANICUM SCRIBNERIANUM nom. n.

Panicum scoparium S. Wats. in A. Gray, Man. Ed. 6, 632. 1890. Not Lam.

Panicum scoparium var. *minor* Scribn. Bull Univ. Tenn. 7: 48. 1894. Not *P. capillare* var *minor* Muhl. 1817.

This plant is certainly not the *P. scoparium* of Lamarck. That is found only in the southern mountains and is a tall large-leaved grass with a few-flowered panicle. There seems to be no available name published for this plant, and so the above is proposed, in honor of Prof. F. L. Scribner, who was the first to indicate its difference from *P. scoparium* Lam.

PANICUM MINUS (Muhl.).

Panicum diffusum Pursh, Fl. Am. Sept, 1 : 68. 1814.

Panicum capillare var. *minus* Muhl. Gram. 124. 1817.

Panicum capillare var. *sylvaticum* Torr. Fl. U. S. 149. 1824.

Panicum Philadelphicum Bernh; Nees. Fl. Bras. 198. 1829.

This plant is readily distinguished from *P. capillare*, of which it has been considered a variety by its more slender habit, and smaller spikelets in pairs at the extremities of the ultimate divisions of the smaller and less branched panicle.

PANICUM BOREALE n. sp. Culms at first erect and simple, 1°–2° tall, later sometimes decumbent and somewhat branched, smooth and glabrous. Sheaths shorter than the internodes, smooth and glabrous, ciliate; ligule short, ciliate; leaves 3′–5′ long, ¼′–½′ wide, erect, truncate or rounded at the sparsely ciliate base, acuminate; panicle 2′–4′ in length, ovate, branches 1′–2′ long, spreading or ascending; spikelets 1″ long, about equalling the pedicels, ellipsoid, pubescent; first scale ovate, obtusish, about one-third the length of the spikelet; second and third ovate, 7-nerved, pubescent, equalling the fourth; fourth oval, chartaceous, acute, slightly exceeding ¾″ in length.

Moist soil, Newfoundland and Ontario to New York, Vermont and Minnesota. This plant was first noted by the writer in 1893 in the Catskill Mts., near Cario, N. Y. The smaller forms somewhat resemble *P. laxiflorum*, but the glabrous sheaths and shorter leaves, and the different shaped spikelets readily distinguish it from that species. No. 222, Robinson and Schrenk, 1894, and Macoun's plant, collected at Windsor, N. S., June 29, 1883, belong here.

Panicum sphagnicolum n. sp. Culms 2°–3° long, at first simple, later repeatedly dichotomously branched, the branches very divergent. Primary sheaths hirsute, those of the branches glabrous; ligule a ring of short hairs; leaves smooth and glabrous, the primary 2′–3½ long, 2″–5″ wide, those of the branches 1′ long or less, ½″–1½″ wide, appressed; primary panicle about 2′ in length, the branches ½′–1′ long, spreading; secondary panicles about ½′ long, raceme-like; spikelets 1¼″ long, few and appressed, pubescent; first scale ovate, acute, 1–3-nerved, about half the length of the spikelet; second scale broadly ovate, 7-nerved, somewhat shorter than the 7–9-nerved third one, the fourth chartaceous, smooth, elliptic, acute, slightly exceeding 1″ in length and equalling the third.

The late and much branched state was collected by the writer this summer in a sphagnum bog at Lake City, Florida, and will be distributed as No. 2500. The main stem rises through the sphagnum and then divides dichotomously, the branches spreading out over the surface of the moss, the ends being erect. The early and simple form was found by A. W. Bitting in a cypress swamp at the same place, on April 2, 1892.

IXOPHORUS Schlecht. Linnaea, 31: 420. 1861–62.

[SETARIA Beauv. Agrost. 113. 1812. Not Ach. 1798.]

Otto Kuntze (Rev. Gen. Pl. 767) has referred these grasses to the genus *Chamaeraphis* R. Br., and this disposition of them has been accepted by several writers. But *Chamaeraphis* is a tropical genus in which the spikelet and bristle fall attached, while in the plants in question the spikelet articulates above the bristles, hence leaving them persistent when it falls. Feeling confident that the two groups are generically distinct, I have sought for a published name for the latter, and find *Ixophorus* of Schlechtendahl to be the earliest one available. It is based on *Urochloa uniseta* Presl, which is *Setaria uniseta* Fourn. The forms occurring in the northeastern United States are as follows:

1. Ixophorus verticillatus (L.).

Panicum verticillatum L. Sp. Pl. Ed. 2, 82. 1762.
Setaria verticillata Beauv. Agrost. 51. 1812.

2. IXOPHORUS GLAUCUS (L.).
Panicum glaucum L. Sp. Pl. 56. 1753.
Setaria glauca Beauv. Agrost. 51. 1812.

3. IXOPHORUS ITALICUS (L.).
Panicum Italicum L. Sp. Pl. 56. 1753.
Setaria Italica R. & S. Syst. **2**: 493. 1817.

4. IXOPHORUS VIRIDIS (L.).
Panicum viride L. Sp. Pl. Ed. 2, 83. 1762.
Setaria viridis Beauv. Agrost. 51. 1812.

STIPA AVENACIOIDES n. sp. Culms 2°–4° tall, simple, erect, slender, smooth or puberulent below the lower nodes. Sheaths about half the length of the long internodes, smooth and glabrous; ligule obtuse or acute, 1″ long or less; leaves involute-setaceous, smooth and glabrous, the basal about 1° long, those of the culm 1′–5′ long, the uppermost often nearly wanting; panicle simple, 4′–10′ in length, finally long-exserted, the scabrous branches 1′–3′ long, the lower in pairs; spikelets few; lower halves of the empty scales purple, 5-nerved below, acuminate, the lower 8″–10″ in length, the upper slightly longer; flowering scale with a ring of short brown hairs at the apex, brown, otherwise glabrous, 7″–8″ long, including the callus which is 3″–4″ long, and covered with appressed brown silky hairs increasing in length toward the top; awn 3′–4′ long, pubescent below, twisted for about half its length, tightly so at the base, twice bent.

Collected by the writer in 1895 in the pine lands near Cassia, Lake Co., Florida, No. 2051.

CAMPULOSUS CHAPADENSIS Trin. Spec. Gram. *pl. 303*.
Ctenium Chapadense Doell, Mart. Fl. Bras. **2**: Part 3, 73. 1878.

This plant was found growing plentifully by the writer this summer in the flat woods at Lake City, Florida, no. 2212. A. H. Curtiss collected the same in East Florida in 1875; his no. 4058 also appears to be this plant. It was also secured by Fredholm in Duval Co., Fla., in 1893, no. 313.

It differs from *C. aromatica* (Walt.) Scribn. (*Ctenium Americanum* Spreng.) in its more slender habit and narrower spikes; smaller spikelets divergent from the rachis, not pectinate; the scales narrower and very acute; the awns more delicate and much longer.

CHLORIS NEGLECTA n. sp. Culms 2°–4° tall, erect, much compressed, smooth and glabrous. Sheaths glaucous, compressed, those at the base of the culm crowded and equitant; ligule a ring of short hairs; leaves smooth and glabrous, glaucous, 4′–15′ long, 2″–4″ wide, abruptly acute, the uppermost culm leaf short, and usually remote from the infloresence, or often wanting; spikes 4–6, 3′–5′ long, erect or slightly spreading; spikelets divergent to the triangular rachis, which is scabrous on the angles; empty scales of the spikelet 1-nerved, scabrous on the keel, the first ovate, acute, about two-thirds as long as the second; second 2-toothed, the teeth obtuse and erose at the apex, oblong, 1½″–2″ long, including the scabrous awn which is ½″ long; third scale about 1½″ long including the awn which is ½″ in length, brown, ovate, 3-nerved, the nerves pubescent with long ascending hairs; fourth scale empty, 1″ long, elliptic in outline, cucullate, remote from the third, bearing an awn about ½″ long just below the apex; seed ¾″ long, narrowly oval in outline, triangular, translucent, yellowish streaked with purple.

Resembles *C. Floridana* Vasey; that species differs in having only 1 or 2 spikes; larger spikelets having 5 scales and 2 flowers, the upper one staminate; second empty scale broad and rounded at the erose apex; the hairs on the nerves of the third scale shorter; the fourth scale obovate and obliquely truncate at the apex.

Collected by the writer near Orange Bend, Lake Co., Florida, during the past summer, in low pine lands, no. 2149. It was also secured by A. H. Curtiss at Jacksonville in 1875; his number 3445 is the same. Fredholm obtained it along the banks of the St. John's River in Duval Co., Florida, in 1893, no. 319.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE.—No. 81.

Contributions to American Bryology, XI.

(Plates 248 and 249.)

BY ELIZABETH G. BRITTON.

[Reprinted from The Bulletin of the Torrey Botanical Club, Vol. 22, No. 11, Nov., 1895.]

Contribution to American Bryology—XI.

By Elizabeth G. Britton.

1. COSCINODON RAUI AND COSCINODON RENAULDI.

(Plate 248.)

Owing to the fact that the upper part of the leaf in *Coscinodon* is colorless, it has happened that in the first descriptions of both *C. Wrightii* and *C. Raui*, the vein has been described as ending below the apex. In describing *C. Wrightii* Sullivant said of the leaf that it was "costate half way" (Mosses U. S. 38. *pl. 4.* 1856). In the Icones (71. *pl. 45.* 1864), he corrected this mistake, figuring the vein extending into and forming the awn.

Austin made the same mistake about *C. Raui* (Bull. Torr. Bot. Club, **6**: 46. 1875), describing the leaf with the vein ending below the apex, "costa valida sub apice finienti," yet in the type specimens preserved in his herbarium at Columbia College, the vein is clearly excurrent, forming a terete, white awn, most clearly seen in old abraded leaves when the blade is torn away. He recognized its true character in *C. Wrightii*, for he says of it "costa extending into the much longer, more terete and more scabrous hair point;" yet he failed to see it in his own species. This is the more remarkable, as he had in his herbarium an original sketch of the leaves by E. A. Rau, on the margin of which Mr. Rau had written, "Leaves throughout chlorophyllose, except the long excurrent costa or tip."

In the Manual (L. & J. Mosses of N. Am. 155, 1884) this mistake is repeated and in describing *C. Renauldi* (Bot. Gaz. 15; 41. 1890) M. Cardot cites this as one of the points of difference between these two species, the other being a difference in the teeth. These are described in the Manual as " entire, split or merely perforated here and there on the line of division, erect when moist, open when dry." This is a translation from Austin's original Latin description, but it does not agree with all his specimens. The teeth are very fragile in his species, and are seldom seen entire and unbroken, except on a freshly opened capsule. They are long and slender, perforate at base, three to four parted above, and densely papillose; later they divide into slender divisions, and on old capsules have disappeared altogether, leaving only the annulus. As compared with the figures of *C. Renauldi*, they differ only in not being truncate when perfect. From *C. Wrightii*, as figured in the Icones, these teeth are much longer, more acuminate, the divisions narrower, more slender and regular, the perforations almost continuous above, and splitting into three to four slender divisions to each tooth. The annulus also is not like the mosaic of flat cells figured by Sullivant, there are only two rows of cells instead of three, and the last row has elongated vesicular cells. In the description of *C. Renauldi*, the annulus is not mentioned, nor is it figured in the plate. We have not seen a capsule of this species, but in a recent letter M. Cardot states that the annulus is present, but that he has not been able to determine whether it is persistent or fugacious as all the capsules which he has examined were too young. In the plate the teeth are figured as truncate. M. Cardot says that they were taken from freshly opened capsules, but we are of the opinion that if he were to search in the apex of the lid he would find the remnants of those teeth, as we have found in *C. Raui*, that the tips often fall with the lid, and it was with difficulty that we secured a mount sufficiently perfect for our drawing.

In the description of *C. Renauldi*, M. Cardot states that he has not seen authentic specimens of *C. Raui*, Aust., but this is a mistake, for the specimens I sent him were from Austin's herbarium, labelled Austin by "*Grimmia Raui*, Colorado, Mrs. Roy," and were probably from the same collection as those in the herbarium of E. A. Rau, collected by Brandegee sent by Mr. Rau. These are the specimens cited by Cardot under *C. Renauldi*, and seem to prove conclusively that the two species are the same.

The specimens collected by J. M. Holzinger on exposed sand bluffs at Winona, Minnesota, have been determined by M. Cardot as *C. Renauldi*, and by me as *C. Raui*. We also have specimens collected by Mrs. T. A. Williams at Rapid City, South Dakota, which we have referred to this species.

The plate of *C. Raui* is taken from type specimens in Austin's herbarium sent to him by E. A. Rau, collected by Brandegee.

Description of Plate 248.

1. Plants natural size; 2. one enlarged; 3. antheridial branch; 4. archegonia branch with the calyptra partially exserted; 5, 6, 7. outlines of leaves; 8. antheridia and bracts; 9. basal half of leaf; 10. apex, showing long rough awn; 11. calyptra; 12. capsule with lid; 13. capsule without lid; 14. old capsule with fragments of teeth; 15. two teeth; 16. annulus; 17. spores.

2. DICRANELLA HETEROMALLA AND ITS VARIETIES.

(PLATE 249.)

According to European authorities this is a very variable species, several of its more striking varieties having received names. The typical form seems to be according to Schimper and Limpricht, the one having the pedicels erect but more or less sinuous. Braithwaite, however, states that the pedicels may be curved, and Boulay says that owing to the variability of the flexion of the pedicel at its summit the capsule assumes very diverse attitudes.

Several of the European varieties have been recognized and distributed in American exsiccatae; but we have been surprised to find that even in this common species there still remain some points to be cleared up, and possibly two allied species to be erased from our lists.

The common lowland form ranging along the Atlantic plain from Newfoundland to Florida, west to Dakota, which grows abundantly along sandy roads in dense cushions at the roots of trees and on dry banks, seems to be typical, having the seta erect, flexuose and glossy yellow, agreeing with European specimens and exsiccatae. It was distributed in Drummond's Mosses, 2d

Ed. No. 54, in Sulliv. & Lesq. Musci Bor. Am. No. 67, and Austin Musci App. No. 79.

DICRANELLA HETEROMALLA ORTHOCARPA (Hedw.).

Dicranum orthocarpum Hedw. Sp. Musc. 131. *pl. 30.* 1801.

Dicranella Fitzgeraldi Ren. & Card. Bot. Gaz. 13: 197. *pl. 13.* 1888.

This variety is not recognized as distinct by Limpricht, but is given as a synonym of the species, into which it merges insensibly, having the same range. The type locality was at Lancaster, Pennsylvania, but we have not seen the type specimens. The capsule, as the name implies, is not only erect but straight, in the most depauperate forms being so small and black as to suggest *Ditrichum tortile.* This is true of the specimens distributed in Drummond's Southern Mosses as No. 53, and in the original specimens of *D. Fitzgeraldi,* from Florida, as described and figured in the Gazette. M. Cardot has sent us four of these typical specimens; all are old and deoperculate, and represent, in our opinion, a very depauperate state of this variety. Quite recently we have received No. 156 of Ren. & Cardot Musci Am. Sept. collected by J. M. Holzinger at Rock Creek, near Washington, D. C. These specimens are in fine condition, and contradict the original description of *D. Fitzgeraldi* in several points, the old capsules when deoperculate being contracted below the mouth, which is slightly oblique; the walls also are often sulcate, so that we have no hesitation in saying that these are *D. heteromalla* var. *orthocarpa.* They agree with Sull. & Lesq. Musci Bor. Am. No. 68, and Austin Musci Ap. No. 80.

The variety *interrupta* Schimp. has also been recognized and distributed in American exsiccatae, and the var. *stricta* occurs abundantly on decomposing sandstone rocks in the Dells of the Wisconsin. Recently I have made the acquaintance of what may be called the mountain form of this species (Plate 249) for which we have not yet discovered a name, but which we think has been figuring in the Manual as *D. curvata.* It first puzzled me by growing in the dense mats of *Campylopus Virginicus* Aust., raising false hopes that it might be the fruit of this species, which has thus far only been collected sterile. The pedicels were strongly recurved, and the capsules when fresh, ovoid and smooth; but when dried they changed to the characteristic cinnamon color of *Dicranella heteromalla*, with its twisted mouth and sulcate walls, and the pedicels became erect. These specimens grew at an elevation of 5678 ft. on the summit of White Top, Virginia, on rocky ledges in shade, and were in young fruiting stage on June 26, 1892. Later in the same year, September 29th, I collected a few small plants in the trail up Mt. Marcy, in the Adirondack Mountains, New York. These also were small plants, with plump, ovoid, green capsules and yellow curved seta. But when dried the pedicels became erect, the capsules turned yellow, and showed unmistakably that they were only *Dicranella heteromalla*. It was also found at other points in the vicinity, usually in shade under or on the roots of trees in steep, sloping paths, often in very damp, black soil. Along the roadside, near the Lodge, the pedicels were seldom recurved, though the plants were small. In 1894 the form with recurved pedicels was very abundant both on Mt. Marcy and Mt. McIntyre, and formed large patches at considerable elevation on both these mountains. I had also collected it near Stowe, Vermont, in 1884, and been puzzled by the straightening of the pedicel in drying. In 1893 it was found growing with *Dicranodontium longirostre* on shady sandstone ledges of the Wisconsin Dells, and it surprised me to learn from Dr. Barnes that it was the common form of *Dicranella heteromalla* in that vicinity. It has recently been sent to me by D. A. Burnett, collected in the mountains of Pennsylvania on sandstone rocks at Bradford, associated with *Dicranodontium longirostre*, and it was collected in similar habitat and the same association by Mr. D. A. Hopkins in West Virginia. We also have specimens collected by F. L. Harvey in Maine, by Edwin Faxon on the bridle path at 3,500 feet elevation and on the summit of Mt. Lafayette; also from the Lake of the Clouds on Mt. Washington. Pringle collected it on Mt. Mansfield, Vermont, and A. C. Waghorne in Newfoundland. I find three specimens collected by Austin in 1872 in the White Mountains, which had been sent to T. P. James for determination; accompanying them is an autograph slip from James stating that they "must be a *Dicranum*, but I do not make it *subulatum*."

Now it is a curious fact that *Dicranella curvata*, though reported from two stations in North America, does not occur in any

North American herbarium, as far as we can determine. We have searched diligently for it both in the field and in several collections, and have come to the conclusion that this mountain form of *D. heteromalla* with curved pedicels has been mistaken for it.

It is recorded in the Manual from two localities only:

"On sandstone rocks, Lancaster, Pennsylvania (T. C. Porter), and from the White Mountains (James). Very rare."

Dr. Porter very kindly sent us a bit of his specimen, and it does not match European specimens of *D. curvata*. It seems referable to depauperate specimens of *D. heteromalla* var. *orthocarpa*. The White Mountain specimens cited have not been found in the herbarium of T. P. James. Macoun does not record it from any locality in Canada, nor have we any other record of its having been collected by anyone else.

3. NOTES ON THE GENUS LEERSIA, HEDW.

LEERSIA Hedw. Fund. Musc. 2: 88. 1782.

ENCALYPTA Schreb. Gen. 2: 759. 1791.

This genus is much in need of revision, but we have not been able to take the time to do more than set right two or three glaring mistakes which have come to our notice, in studying the Eastern species, and to call attention to collectors in our Western and Northern States to the importance of securing good and abundant specimens.

There are five species known to occur in the eastern part of the continent, *L. extinctoria* (*E. vulgaris*) *L. laciniata* (*E. ciliata*) *L. rhabdocarpa*, *L. procera* and *L. contorta* (*E. streptocarpa*). One of the Eastern species *L. rhabdocarpa* has been found in Quebec, but not yet credited to the United States, it is hoped that it will be found in the mountains of New England if attention is called to the genus.

Of the additions in Macoun's catalogue; *E. subspathulata*, *E. leiomitra*, *E. leiocarpa* and *E. cucullata* are from British Columbia, or Athabasca, and although Prof. Macoun has generously furnished us with all his collection of this genus, and allowed us to keep duplicates, yet we have not felt warranted in taking the time at present to compare the specimens carefully. We have thought it very important, however, to correct Kindberg's confusing remarks regarding *E. Macounii* Aust. and *E. ciliata* Hedw.

ENCALYPTA MACOUNII AUST. Bot. Gaz. 2: 97. 1877. L. & J. Man. 182, 1884. Macoun's Cat. 6: 94-95 only in part (1892).

The type of this species is preserved in Austin's Herbarium at Columbia College. The specimens are abundant though immature. They have been compared with the original description, which is copied in Lesquereux and James Manual. All the statements but one have been verified; the seta is described as "minutely papillose, rather densely so above the middle." They have been examined with a magnification of 330 diameters, and out of a dozen pedicels on none of them has been found a trace of roughness.

Austin compared it to *E. affinis* Hedw. (*E. apophysata*, N. & H.). We have also made the same comparison with No. 816 of Rabenhorst's Bryotheca Europaea, and find that Austin was right. The calyptra agrees exactly in having pale irregular papillae to the fringed base, though we should call it rather minutely scabrous than "densely papillose." But the leaf characters are also very plain, the margins being strongly revolute, the vein ending below the apex, and very rough on the back with double papillae; the basal cells are clear with the short transverse walls, yellow and thickened into ridges and also papillose. This is true also of *E. affinis*, but the vein in that species is excurrent into an awn. The peristome is described by Austin as "single, the teeth of medium length, very narrow and filiform, red, more or less split into two equal segments, nodulose and granulose." This agrees with the figures of *E. apophysata* in the Bryologia Europaea, but Limpricht says the peristome is double and has a short basal membrane, one-third the length of the teeth, which he figures as 247, page 118. We have been able to detect this in No. 816 of Rab. Byoth. Eu. even when the peristome is old, but not in Austin's specimens. This would add another distinction between *E. apophysata* and *E. Macounii*, though they are evidently closely allied.

The type locality is "On rocks, Stewart's Lake Mountain, B. C., collected by Macoun, June 21, 1875.

On consulting Macoun's Catalogue, I find this locality is not given the first place as it should be, and that the specimens sent by me from Mount Mackay and Kakabeka Falls, named *E. ciliata*, duplicates of which I have in my herbarium, are also referred to this species. I have re-examined them lately, and still insist that the name I originally gave them is correct. Number 133 of Macoun's Canadian Mosses was distributed as *E. Macounii*, collected "on rocks at Wellington Mine," Vancouver Island, by Macoun. These specimens in our set prove to be *Encalypta vulgaris* var. *pilifera*. If these are the specimens on which Kindberg bases his remarks, it is not surprising that he could not find the characters indicated by Austin.

Under the heading of *E. ciliata* he says (Macoun Cat. 6: 94): "*Encalypta ciliata* Hedw. and *E. Macounii* Aust. are very difficult to distinguish apart. The descriptions of the best authors are also not consistent." He then quotes from them to show that the position of the teeth does not agree in all the descriptions. From this he says: "It is probable that the authors are confounding both species, also occurring in Europe. *E. ciliata* is principally found in the lower mountain districts. *E. Macounii* seems to be an alpine species also collected by Kindberg in the Norwegian Alps and considered a new species, *E. borealis* Kindb. Laubm. Schwed. & Norweg., but exactly agreeing with the original specimens of *E. Macounii* sent by Prof. Macoun."

It is interesting to know what Norwegian bryologists think about this, and we would refer to the remarks by Chr. Kaurin in the Bot. Centbl. 41: 358 (1890). He states that in the contribution referred to by Kindberg the specimens which were called *Encalypta Macounii* are found to differ from the portion of the type which I sent him.

To continue the quotation from Macoun's Catalogue, page 95: "The description made by Austin, cited by Lesq. & James, is, however, not completely exact; 'calyptra densely papillose, pedicel reddish, papillose, the leaves muticous;' such characters are not to be found, the calyptra and the yellow pedicel are nearly as smooth as in the true *E. ciliata*, to which the descriptions of the peristome by Schimper and Braithwaite probably belong. The descriptions by Lesq. & James and Boulay could partly be referred to *E. Macounii*, although all authors agree that in the description of *E. ciliata*, 'without a distinct collum;' *E. Macounii* has a distinct collum and the margins of the leaves distinctly reflexed. I possess no specimens of the true *E. ciliata* from North America. It may not occur there."

Now it seems evident from all this that Macoun has sent Kindberg a specimen of *Encalypta* closely allied to *E. ciliata*, wrongly named *E. Macounii*, and from this false premise he has arrived at the above conclusions. Whether all the specimens cited in Macoun's Catalogue as *E. Macounii* were sent to Kindberg is not clear, but probably this is not the case. It is likely that only a few of them were, and that the rest have been transferred without examination by Prof. Macoun in making up the list.

We note one that was not transferred, for No. 132 Canadian Mosses is cited under *E. ciliata*, with the label locality reading: "Crevices of rocks, common from Ottawa westward." These specimens have been examined and compared with the types of *E. Macounii.* They are quite distinct in the excurrent vein, plane margins, smooth calyptra, and the mouth bordered by 5–6 rows of hexagonal cells projecting above the base of the teeth. We have also examined all the other specimens in Austin's herbarium sent to him by Macoun and named by Austin *E. ciliata.* These include specimens collected at Stewart's Lake, date and locality the same as type of *E. Macounii*, but distinctly *E. ciliata;* also those from Lake Athabasca, August 29, 1875; Cascades, May 17, 1875; and Hastings county, August, 1874. All of these agree with the characters of *E. ciliata* as described by Limpricht, even to the size of the spores, but in many cases it is difficult to distinguish the preperistome as described by him. The deep projecting border of the mouth is quite distinct, as well as the scattered stomata, with the surrounding cells not differentiated, but long and thickened longitudinally. The neck also is short, but always distinct, and sometimes stomatose, though usually the stomata are above the base of the sporesac.

ENCALYPTA CILIATA (Hedw.) Hoffm.

We find in the Jaeger Herbarium all the exsiccatae cited by Limpricht, and have critically compared No. 19 of his Bryotheca Silesiaca, with our specimens of Macoun's Canadian Mosses No. 132. and Sull. & Lesq. Musci bor. Am. No. 165, Ed. 2. We find they agree in all the characters described, with a certain amount of variation in the length of the awn, and the vein which is also sometimes serrulate on the back for a short distance below the apex of the leaf; the margins are more or less undulate and slightly revolute below, erose papillose above, and the basal cells are clear and smooth, with the short transverse walls often brown but not projecting. The seta varies somewhat in length, but is smooth and yellow, often red at the junction with the capsule; there is a distinct neck measuring .2 mm., that is the sporesac does not reach the base of the capsule, the stomata are scattered above its base, and the cells of the walls are long and thickened, but not radiating around the stomata; those of the mouth are shorter and hexagonal in 5–6 rows, and project above the base of the orange-red teeth, the last rows falling in fragments with the lid. The beak of the lid is shorter than the capsule, 1–1.5 mm. and the calyptra is fringed at base and generally entirely smooth, though occasionally scabrous at apex. The peristome is erect when dry, and strongly incurved when moist; the teeth are composed of 5–7 joints, and are paler and smoother at apex. Limpricht describes a "preperistome of 32 isolated, smaller, brownish-red plates half the length of the teeth, falling off, or occasionally lacking." We have had great difficulty in distinguishing these plates, both in our specimens and the Europeon ones, but find the teeth are irregularly papillose, that is some joints will be and others not, especially the upper ones, which are generally lighter colored, and presume that is only under very favorable circumstances, on fresh young teeth, that the preperistome can be seen. The Bryologia Europaea indicates this in figures 14 and 15, as well as a certain amount of irregularity in the teeth which we have also observed. The spores are quite alike in American and European specimens, in size and the peculiar lines due to shrinking which give them the aspect of a rose-cut diamond with a flat central facet and six radiating around it.

If there are two species mixed under *Encalypta ciliata*, as Kindberg seem to think, we have not yet been able to detect it in American specimens, as compared with authenticated European ones. It has been distributed as Drummond's No. 50 pp. "Rocks and banks along the Mountains," mixed with *E. rhabdocarpa* in Sull. & Lesq. Musci Bor. Am. Ed. 2, No. 165, in Austin's Musci App. No. 174 (1870) and Macoun's Canadian Mosses No. 132. It ranges in the Eastern States from the mountains of New York and New England to Illinois, Wisconsin and Minnesota, Ontario, Quebec, New Brunswick, and north to Greenland. In the

Rocky Mountains from New Mexico to Idaho, also in California, Oregon and Washington, through British Columbia, to Behring sea.

Var. *microstoma* (Bals. & DeNot.) Sch. Br. Eu. Index, p. 7. 1855. *Encalypta microstoma* Bals. & DeNot. Pugill. No. 18. 1836.

We received from the Department of Agriculture specimens collected by Wolf and Rothrock in Colorado, 1873, which agree with the description given by Limpricht of this variety in the short seta, small capsule, with a small mouth, short teeth, lacking on some of the capsules, and the cells of the walls broader and much thickened, with very distinct stomata. The spores, however, seem to be smooth as in the species.

ENCALYPTA LONGIPES Mitt. Journ. Linn. Soc. **8**: 29. 1865.

We quote the original description:

Dioica? caule brevi ramoso, foliis patentis concavis ambitulate ellipticis acutis paulo supra basin angustatis nervo percurrento obtuse carinatis, margine minute eroso, cellulis basi infima oblongis hyalinis inde viridibus mox abbreviatis quadrato-rotundatis papillosis, perichaetialibus parvis vaginulam vix superantibus latissime ovatis acutis theca in pedunculo longissimo rubro ovato-cylindracea basi apophysata, operculo subulato subaequilongo-peristomo dentibus angustis elongatis, calyptra basi nuda apice laevi."

"Seta an inch and a half long, slightly flexuose. Capsule too immature to show if it is furrowed."

Lesquereux and James, in their Manual, on page 183, say in a foot note:

"Upon examination of the specimens of *E. longipes* Mitt. in all of Drummond's sets the characters have been found identical with those of *E. procera;* the plants monoecious; the calyptra papillose, its borders emarginate, erose or fimbriate at base; perichaetial leaves piliferous; capsule spirally striate, etc. The differences that appear in the characters indicated by Mitten result from the unripeness of the specimens he had for examination."

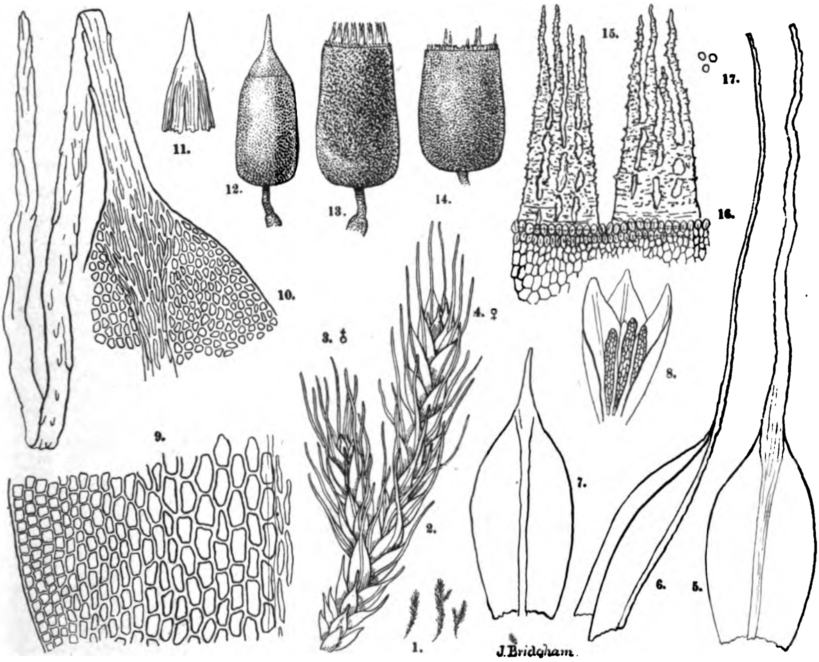
We were permitted by Dr. Watson to examine the type of this species at the time that Mitten's types were still at Cambridge, and we have compared them with the original description and with the above remarks. We can corroborate Mitten's statements, with additional evidence that this is not the same species as *E. procera.*

The calyptra is smooth throughout, and so is the vein of the narrow leaf, which, moreover, as the description says, has a minutely erose margin, formed of projecting cells which appear smooth, not densely papillose as in *E. procera*. The upper cells of the leaf, in fact, are not papillose but mamillate, projecting on both surfaces of the apex of the leaf, but slightly. Not only is the peristome also described as simple, but a drawing is preserved with the type, showing a single row of teeth, with 2–3 appendiculate basal segments. Kindberg in Macoun's Catalogue says that he too has seen authentic specimens of Drummond's in the collection of Dr. C. Mueller, and states that the "costa is very rough, the calyptra regularly laciniate, very rough and subspinulose above."

It is evident from these remarks, however, that the specimens could not have been authentic, for this is a direct contradiction of the original description, verified by a reëxamination of the type specimen.

We do not like to venture an opinion without careful comparisons, especially as this species is so meagrely represented in the type, which is also immature, so that it is rather unsatisfactory for purposes of comparison; yet it seems to be very closely related to *E. leiomitra* Kindb., belonging to the group of *E. rhabdocarpa* Schwaeg., from which it differs presumably in its smooth capsule (?), although the original description states that the specimens are too young to show this character.

BULLETIN OF THE TORREY BOTANICAL CLUB—PLATE 248.



COSCINODON RAUI AUSTIN.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE.—No. 82.

Some Special Phylogenetic Adaptations in Lichens.--I.

BY ALBERT SCHNEIDER.

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 22, No. 12, Dec., 1895.]

Some special phylogenetic Adaptations in Lichens.—I.

BY ALBERT SCHNEIDER.

In a previous paper* I endeavored to show why lichens should be considered as a distinct class of plants. It is my purpose in this paper to discuss briefly some of the special adaptive features which these plants have acquired since their phylogeny as lichens. I shall preface this discussion with a few introductory statements.

Everywhere we can observe a balanced relationship between living organisms and their environment. All structures, no matter where they may occur, or what form they may assume, serve a definite purpose and perform a definite function. In many instances the structural conformations are so "rudimentary" and "imperfect" that we are unable to recognize their physiological significance. It is however unscientific to say that such structures perform no function, because we are unable to recognize a function. It were much more consistent to admit our ignorance and await further investigations, which may clear up some of the difficulties. I make these preliminary statements with special reference to lichens, because many of their structural adaptations have as yet not been satisfactorily explained. I also wish to call attention to the importance and special biologic significance of the tendency among modern scientific botanists to point out the interrelation of structure and function. There is no function without structure: without structure there could be no function.

From this it becomes evident that morphological and physiological investigations must go hand in hand. If we neglect one for the other we fall into a dangerous error, dangerous to the progress of biological science. The time is fortunately slowly passing away when morphology (usually external morphology) alone constitutes the science of life. The herbalists who go into wild ecstacies over having "discovered" a "new species" are slowly giving way to the scientists who are solving or endeavoring to solve some difficult life-problem. The fact that many scientific efforts are fruitless in direct results is not a reason for becoming discouraged; much less a reason why old fashioned "empiricists" should gloat over these failures and make strenuous efforts to perpetuate the old regime.

---

* The Biological Status of Lichens. BULLETIN, 22: 189–198. 1895.

The knowledge gained from a purely morphological study of lichens, is in itself of little practical value if we can not find the correlated physiological interpretation. The scientific study of lichens is of very recent origin. Our knowledge of the physiology of these plants is especially deficient. Sufficient is, however, known in a general way, to enable us to give fairly accurate hypothetical physiological interpretations of most of the anatomical structures.

It is perfectly consistent to suppose that the lichen, during phylogenetic history, has undergone great adaptive changes. This statement is axiomatic and requires no further elucidation. From the nature of things it is also evident that the thallus has undergone the greatest adaptive changes.

As has been known for some time, the thallus in particular performs the function of assimilation, due to the presence of the symbiotic algae. Within recent years, Jumelle * has made a special study of chlorophyllian assimilation in lichens. The special structural adaptations which we are about to discuss are due to the fact that the fungal symbiont, which is incapable of assimilating CO_2, must make suitable concessions to the position and arrangement to the algal symbiont. This we find to be the case. In this paper I shall devote myself to foliaceous thalli and shall briefly consider some of the typical structures met with in such thalli; namely, the epidermal layer, the upper cortical layer, the algal ("gonidial") layer, the medullary layer, the lower cortical layer and the rhizoids. A typical epidermal layer is not present in all foliaceous lichens. It is, however, well developed in *Sticta* and *Stictina*. It consists of hyphal cells, two or three layers in thickness. The cells are placed horizontally and are very closely crowded, thus forming a protection against excessive evaporation. It serves a function similar to the epidermis in higher plants. In the genus *Leptogium* the epidermis consists of a single layer of cells presenting a close resemblance to the cuticle of higher plants. We find a similar cuticular covering in the related genera, *Mallotium*, *Hydrothyria* and *Polychidium.* This structure not only serves the function of an epidermal layer, that is, prevents excessive evaporation, but also a mechanical function, giving greater firmness to the thallus. In other words, the single layer of cells in the above genera of the Collemaceae serves a function similar to the many-layered epidermis and cortical structure in *Sticta*, *Stictina* and other genera.

---

*Jumalle H. Recherches Physiologiques sur les Lichens. Revue generale de Botanique, 4: 49–64, 103–121, 159–175, 220–231, 259–272, 305–320. 1892.

The epidermal layer is generally colored, usually a yellowish brown or dark brown. This is no doubt for the purpose of tempering the influence of sunlight. We may safely assume that the epidermal layer serves three functions. Its primary function is to prevent the excessive evaporation of moisture; its secondary functions are to reduce the injurious effect that direct isolation would have upon the symbiotic algae and to aid in protecting the underlying tissues as well as to give additional firmness to the thallus.* Below the epidermis is found the cortical layer, which is usually of considerable thickness in the majority of foliaceous lichens. I will not dwell upon its anatomical structure, as that is sufficiently well known. Its primary function is mechanical. It also serves a function similar to that of the epidermis; it prevents the evaporation of moisture.

According to the principles of mechanics and for the purpose of protection the cortical layer should occur near the upper surface of the thallus. But for physiological reasons the algal layer should also be near the upper surface, that the algae may be acted upon by the sunlight and that they may more readily come in contact with the CO_2 of the atmosphere and that they may readily give up the O which is liberated as the result of assimilation. We actually find such an adaptive relationship between the algal layer and the cortical layer. In many of the foliaceous lichens we find that the algae extend almost to the upper surface of certain circumscribed areas; that is the cortical layer is not of uniform thickness. Such an arrangement enables the algae to take up CO_2 from the atmosphere in exchange for the O liberated. This could, however, not take place, if the epidermis and the upper and lower cortical layers were unbroken or without intercellular spaces. I shall now discuss some of the structural adaptations to meet this requirement.

---

* It should be borne in mind that there is no living structure whose function is purely mechanical or purely physiological. "Dead" structures *may* have only a mechanical function.

On the closer examination of a thin vertical section of the thallus, it is found that in many of the foliaceous lichens numerous *intercellular* canals (intercellular spaces) pass from the algal layer through the cortical and epidermal layers. These canals, which resemble the stomata in their physiological function, facilitate the interchange of the gases resulting from the activities of chlorophyllian assimilation. The canals (breathing pores) are much branched and occur most frequently in the thin areas of the upper cortical layer. As a rule, they do not pass to the exterior in a vertical direction. In the epidermal layer they take almost a horizontal course; this is because the cells of the epidermis are elongated horizontally.

In the dry state these canals are practically closed, thus reducing the loss of moisture to a minimum. In the moist state they enlarge considerably, thus enabling assimilation, which is dependent upon the presence of CO_2 and sunlight, to take place. These breathing pores are especially numerous in *Nephromium*, *Solorina* and *Parmelia*.

Other lichen genera do not have the breathing pores just mentioned. For example they are not noticable in the genera *Sticta* and *Stictina*. In these two genera the epidermal layer is distinct, as has been stated. The upper cortical layer is of uniform thickness and consists of very compact, rather small hyphal cells. The lower cortical layer is comparatively thin and its cells are less closely united; yet they are sufficiently compact that no intercellular spaces can be detected. The question now arises, how are the enclosed algae * supplied with the necessary atmosphere? In my opinion this is done by means of the so-called *cyphellae* which occur on the lower surface of the thallus. These structures have long been known to lichenologists. Haller (1776) was perhaps the first author who called special attention to them. He described them as "white circular depressions." This was about all that was known concerning these structures at that time. Acharius was the first to introduce the term cyphellae, which term has been retained up to the present. Since these organs are little known, it will be well to describe them more in detail.

---

* I have purposely substituted the term "algae" for the term "gonidia." Gonidia and related terms as "gonimia," "gonidimia," etc., are meaningless in modern lichenology, and should therefore be rejected.

The cyphellae occur almost exclusively in the genera *Sticta* and *Stictina* and are primarily breaks in the continuity of the lower cortical layer. The hyphae of the medullary layer immediately about the opening in the cortical layer divide more frequently, producing a dense net-work of hyphae or even a semicortical structure. As a rule, the cells of this secondary cyphellar formation extend in a direction at right angles to the outer surface; that is, they assume a suitable position for the conduction of food substances. The margin of the primary cortical layer (the cortical layer of the thallus) is turned more or less outward. As a rule the algae of the algal layer immediately over the cyphellar opening multiply more rapidly, this causing them to accumulate at these areas.

Two kinds of cyphellae may be recognized. Form 1, as seen in *Stictina damaecornis*. The cyphellar depression is usually circular, concave inward, the margin of the cortex forming an outer constriction. The broken-down cortex of the thallus is replaced by the secondary semicortical formation of the medullary hyphae. Its outer surface is usually smooth, devoid of rhizoids, and generally of a paler color than the primary cortical tissue. They are irregularly distributed over the elevated portions of the lower surface of the thallus; none ever occur in the grooves. They appear first in the older portions of the thallus. In form they are quite constant, in size they decrease toward the younger portion of the thallus.

Form 2, as seen in the majority of *Stictas* and *Stictinas*. It is much more common and differs from the former in the absence of the formation of a secondary semicortical cyphellar covering. Instead of a depression as in the former case, there is usually a protrusion of the densely interwoven network of medullary hyphae. Their form is usually less regular. Their position and arrangement is the same as in the first form.

Both forms of cyphellae are sufficiently large to be seen by the naked eye. No cyphellae occur near the actively growing tip of the thallus.

Acharius applied the term cyphellae to the form first described. Those of the second form he considered to be soredia. Nylander retained the name cyphellae for the first form. The second form he designated as *psuedocyphellae*. There is no morphological or physiological reason why the latter should be designated as "false." Indeed it were more consistent to designate the first form as false since they are of less frequent occurrence. Stitzenberger* retains Nylander's distinction into true and false cyphellae and further subdivides them as to color into white and yellow. This subdivision seems to be valueless, since their color depends upon the color of the medullary hyphae. Stitzenberger considers them of special importance in his classification of the Stictei. I am, however, opposed to adopting as primary, morphological characters whose physiology is unexplained.

Having thus briefly treated of the morphology of cyphellae we will now refer to their probable physiological significance. As already stated, they very likely serve to admit air into the interior of the thallus. Some of the older lichenologists looked upon them as vegetative propagative organs, similar to the soredia. They are not soredia, since they usually contain no algae. That the second form may accidentally contain algae is possible, since we find occasional algae throughout the medullary layer. It is, however, unreasonable to suppose that they would normally contain algae, since their position is not suitable for the development of the symbiotic algae. From the nature of the cortical layers and the epidermis in the majority of Stictei, it is reasonable to assume that the cyphellae serve a function similar to that of the stomata of ordinary foliage leaves. That is, the cyphellae and breathing pores of lichens are functionally similar. If it is scientific to make any comparison of the morphology of lichens and phanerogams it may be stated that the cyphellae are analogous to lenticels.* The tissue which closes the opening in the lower cortical layer is the result of a special cambial or meristematic activity.

---

*Stitzenberger, E. Die Gruebchenflechten (Stictei) und ihre geographische Verbreitung. Flora, 81: 88–150. 1895.

*This analogy was pointed out by Dr. Smith Ely Jelliffe at a recent meeting of the Torrey Botanical Club (November 5th).

There is still another adaptive structural feature in the thallus of many lichens, especially in the Stictei, which is of undoubted physiological importance. These lichens present a striking appearance by the numerous ridges and depressions on the upper surface of the thallus. Morphologically and physiologically the ridges are analagous to the vascular system in the true foliage leaves. On microscopic examination it is found that the majority of the medullary hyphae of the ridges extend parallel to the direction of the ridges. In this region the medullary layer is also considerably thickened. It is a structure specialized to conduct the products of assimilation. This wavy outline of the thallus also increases surface expansion, whereby assimilation is increased. Assimilation is most active in the depressed portions of the thallus, which also corresponds to the position of the cyphellae on the lower surface. Such a wavy arrangement of structures also serves a mechanical function; according to the principles of mechanics it affords a better support to the frequently very large thallus.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE.—No. 83.

A Study of the Genus Galactia in North America.

BY ANNA MURRAY VAIL.

[Reprinted from The Bulletin of the Torrey Botanical Club, Vol. 22, No. 12, Dec., 1895.]

A Study of the Genus Galactia in North America.

By Anna Murray Vail.

The genus *Galactia* was established by Patrick Browne in Nat. Hist. Jamaica, 298. *pl. 32. f. 2.* 1756. It was based on the plant figured in the illustration, a species with the stamens of *Galactia* and the showy scarlet flowers of *Collaea*, which forms a connecting link between these two sections. Linnæus reduced the genus to *Clitoria*, describing the Jamaica plant under the name of *Clitoria Galactia*.* Michaux in Fl. Bor. Am. 2: 61, revived the genus, with two North American species.

The following genera have been reduced to *Galactia:*

Odonia Bertol. Lucub. Herb. 35. 1822.

Sweetia DC. Mem. Leg. 358. 1823.

---

* The synonymy of this species is as follows:

GALACTIA GALACTIA (L.).

Clitoria Galactia L. Sp. Pl. Ed. 2, 1026. 1763.

Galactia pendula Pers. Syn. 2: 302. 1807.

ILLUST. Lindl. Bot. Reg. *pl. 269.* 1818.

Collaea DC. Ann. Sci. Nat. (I.) **4**: 96. 1825.
Betencourtia St. Hil. Voy. **1**: 376. 1833.
Leucodictyon Dalz. in Hook. Kew Journ. Bot. **2**: 264. 1850.
Heterocarpaea Scheele, Linnaea, **21**: 467. 1850.

The genus is accepted as described by Taubert in Engler and Prantl, Nat. Pflantzenf. 3: part 3, 369, 1894, where some fifty species are credited to the temperate and tropical regions of both hemispheres.

Stems erect, decumbent or prostrate, *not twining*.

Leaves simple; flowers 1–2, sub-sessile in the axils of the leaves. 1. *G. heterophylla.*

Leaves 3–foliolate, sometimes simple; flowers 1-several in short-peduncled or sub-sessile, axillary racemes or fascicles. 2. *G. erecta.*

Leaves pinnately 3–foliolate or digitately 5-foliolate, with the terminal leafle petioled; flowers 1–4, peduncled. 3. *G. Grayi.*

Leaves 3-foliolate.

Stems erect, branched; leaflets oblong-linear; flowers few, approximated near the top of the rhachis. 4. *G. brachypoda.*

Stems prostrate; leaflets oval or oblong-oval; flowers numerous, showy, scattered often the whole length of the rhachis, or in var. *longeracemosa* mostly near the top. 5. *G. Floridana.*

Stems *twining*, prostrate or climbing on bushes.

Leaflets 3.

Racemes 2–7, usually fascicled, in the axils of the leaves.

Racemes many-flowered, single or branched, as long as or longer than the short-petioled leaves; leaflets round-oblong or sub-orbicular, densely canescent. 6. *G. fasciculata.*

Racemes simple, 5–18 cm. long, flexuous and twisted; leaves long-petioled; leaflets oblong or oblong-orbicular, canescent. 7. *G. canescens.*

Racemes solitary or with a smaller, or rarely with 2 accessory ones.

Racemes as long as the leaves, few-flowered, or the upper flowers solitary in the axils; leaflets broad, oval, thinnish. 8. *G. Texana.*

Racemes as long as or somewhat longer than the leaves; leaflets glabrate or nearly so; leaves and rigid racemes erect on the prostrate or climbing stem. 9. *G. regularis.*

Racemes usually much exceeding the leaves or in some forms of *G. volubilis* shorter than the leaves.

Leaflets ovate-oblong, more or less pilose on both surfaces, rarely nearly glabrate; in var. *intermedia* linear or linear-oblong. 10. *G. volubilis.*

Leaflets oval, villous; peduncles stout, hirsute, much elongated: flowers bright rose-purple. 11. *G. mollis.*

Leaflets ovate-oblong, coriaceous, bright yellow-green; legume hirsute, the broad suture glabrous at maturity 12. *G. Cubensis.*

Leaflets oblong-linear, more or less silvery canescent.
13. *G. Wrightii.*

Leaflets 7–9, elliptical-oblong; flowers white, tinged with red.
14. *G. Elliottii.*

1. **Galactia heterophylla** (Gillies).

Procumbent from a ligneous somewhat fusiform creeping rhizome; stems sub-simple, flexuous, 1–3 dm. long, minutely retrorse-hirsute, becoming glabrous, obscurely angled above; stipules 2–3 mm. long, subulate or setaceous; petioles 4-6 mm. long; leaves few, the basal ones 2–4 cm. long, oblong, the others 3–9 cm. or more long, oblong-lanceolate or linear, acutish at each end, coriaceous, glabrous above, the reticulated veins confluent with the conspicuous marginal nerve and minutely strigose beneath; flowers 1–16 cm. long, rose-purple, on 1–3 mm. long pedicels or 1–3, minutely pedunculate in the axils of the upper leaves; bracteoles minute, setaceous; calyx 6–7 mm. long, campanulate, strigose-hirsute, the acuminate teeth somewhat scarious-margined, the broadly ovate-lanceolate upper one minutely 2-toothed, the others more slender, the middle one the narrowest and longest; vexillum with a conspicuous indentation at the apex, minutely biappendiculate at the base, abruptly tapering to the filiform claw; anthers oblong-ovoid; legume 2.5–3.5 cm. long, 4–5 mm. wide, coriaceous, acuminate, retrorsely hirsute and puberulous, with a somewhat raised suture. Mature seeds not seen.

Original locality, El Rio Quarto, west side of Las Pampas, Argentine Republic.

Type, Gillies in Herb. Arnott, fide Torrey & Gray.

Eastern Texas, Central America. Uruguay and Argentine Republic.

SYNONYMY: *Cologania heterophylla* Gillies; Hook. & Arn. in Hook. Bot. Misc. 3: 181. 1833.

Galactia marginalis Benth. Ann. Wien. Mus. 2: 126. 1838.

2. **Galactia erecta** (Walt).

Erect from a slender ligneous somewhat fusiform rhizome, stems often several from the same root, 2–3 dm. or more high somewhat flexuous, glabrous or nearly so, angled above; stipules 2–3 mm. long, subulate; leaves few, usually remote; petioles 2–5 cm. long, slender; leaflets 2.5–4 cm. long, often reflexed on the rhachis, oblong, oblong-linear or linear, obtuse, rarely acutish, coriaceous, glabrous, glaucous and the veins reticulated beneath, the terminal one subsessile; flowers 8–10 mm. long, purplish, 2–5 in obscurely peduncled, axillary racemes or fascicles; pedicels

1–2 mm. long; bracteoles setaceous, 1–2 mm. long; calyx turning brown, 5–6 mm. long, hirsute, scarious-margined, the lower teeth slender, acuminate, the upper one broader, minutely 2-toothed; vexillum round-ovate, retuse; legume linear-oblong, about 2 cm. long, hirsute; seeds about 6. June–August.

Original locality, "Carolinas."

Dry pine barrens, North Carolina to Florida, Alabama and Louisiana.

SYNONYMY: *Ervum erectum* Walt. Fl. Car. 187. 1788.

Glycine stricta Hook. & Arn. in Hook. Comp. Bot. Mag. 1: 22, 1835.

Galactia sessiliflora Torr. & Gray, Fl. N. Am. 1: 288; 687. 1838.

3. Galactia Grayi.

Decumbent, canescent-sericeous throughout; stems slender, several from a large, thick, ligneous root, retrorsely strigose, 3–6 dm. or more long, simple or branched; stipules minute, subulate; petioles 1–2.5 cm. long, canescent-strigose; leaflets 7–16 mm. long, oblong, sub-cuneate or nearly linear, obtuse, retuse, mucronulate or acutish, emarginate, when 5-foliolate, the terminal leaflet short petioluled, the accessory ones affixed to the lateral pair; sessile or nearly so; racemes 1–4-flowered; peduncles 1–2.5 cm. long; bracteoles minute; pedicels 5–7 mm. long; flowers 1.5–1.8 cm. long; calyx 8–10 mm. long, the teeth slender, acuminate, the slightly broader, upper one minutely 2-toothed; vexillum yellowish, oblong-ovate, retuse, acute at the base, the other petals rose-purple, the keel conspicuously longer than the narrow wings; anthers oblong; legume about 8 cm. long, 5 mm. wide, linear-oblong, acute; seeds 3–4 mm. long, oblong, apparently truncate at the ends.

Original locality, on the Llano River, Texas.

Type, Lindheimer No. 591 in Herb. Columbia College.

Texas, Llano River; San Diego (Miss Croft); Pena and Chenate Mts. (Nealley).

SYNONYMY: *Galactia heterophylla* A. Gray, Bost. Journ. Nat. Hist. 6: 171. 1850. Not *G. heterophylla* (Gillies.)

4. Galactia brachypoda Torr. & Gray, Fl. N. Am. 1: 288. 1838.

Erect, stems slender, branched, at length decumbent, somewhat puberulous, or nearly glabrous, slightly angled and channelled above, 4–6 dm. long; stipules 2–4 mm. long; leaflets 2–

35 cm. long, oblong or linear-oblong, thinnish, obtuse or emarginate, glabrous or minutely appressed-hirsute above, paler, somewhat strigose or glabrate beneath, the lateral ones very short petioluled or nearly sessile; flowering racemes usually shorter than the leaves, at length elongated; flowers rose-purple or purple, 8–10 mm. long, sessile or very short pedicelled; bracteoles minute; calyx 5 mm. long, clothed with spreading, yellowish hairs, the lower lobes acutish, the middle one somewhat the longest, the broader upper one, minutely 2-toothed; vexillum 7–8 mm. long, round-ovate, apparently not indented at the apex and paler in color than the other petals, the filiform claw 1 mm. long; anthers very small, round-oblong. Legume not seen. July–August.

Original locality, Middle Florida.

Type, Chapman in Herb. Columbia College.

Dry pine barrens, Middle Florida.

5. **Galactia Floridana** Torr & Gray, Fl. N. Am. 1 : 228. 1838.

Prostrate, the whole plant hoary-pubescent; stems 2 dm.–1 m. or more long, simple or branched, the upper part often densely and retrorsely white-tomentose; stipules 2 mm. long, setaceous; internodes usually shorter than the leaves; petioles 1–2.5 cm. long, angled; leaflets 1.5–4.5 cm. long, oval or oblong-oval, obtuse, rarely acutish, usually mucronulate, thick and coriaceous, reticulated and paler beneath, the basal ones often one-foliolate; racemes 4–9 cm. long, rarely longer than the leaves, usually many-flowered; flowers 1.2–1.5 mm. long, showy, rose-purple, approximated often the whole length of the rhachis; bracts minute, setaceous; bracteoles close to the base of the calyx; calyx 7–8 mm. long, the teeth scarious-margined, long-acuminate, the upper one entirely or obscurely 2-toothed, the middle lower one considerably longer; vexillum obovate, rounded above, acute at the base, the claw broad and flat; anthers linear-oblong, acute at each end; legume 4–5 cm. long, 4–5 mm. wide, linear, acuminate, tomentose. Mature seeds not seen. June–August.

Original locality, Tampa Bay, Florida.

Type in Herb. Columbia College. Florida..

5*a*. **Galactia Floridana microphylla** Chapm Fl. S. States, 108. 1884.

Smaller; petioles 5–8 mm. long; leaflets 1–2 cm. long, acutish or obtuse, mucronulate, the few flowers almost sessile in axillary clusters. Flowers and legumes not seen.

Original locality, Florida.

Type in Herb. Columbia College.

Florida.

5*b*. **Galactia Floridana longeracemosa** n. var.

Stouter, the leaves and racemes erect on the prostrate stems; leaflets 2.5–4.5 cm. long, 2–3 cm. wide, oval-oblong, conspicuously retuse, glabrate above, somewhat strigose-pubescent beneath; flowers 1.2–1.5 cm. long, bright rose-purple, 2–4 together at regular intervals above the middle of the rhachis; calyx becoming glabrate. Legume not seen.

Florida. J. H. Simpson. 1889.

6. **Galactia fasciculata** n. sp.

Prostrate or climbing high on bushes; stems 1-2 m. or more long, terete, clothed with a close fine retrorse-canescent tomentum; stipules minute, subulate; internodes longer than the leaves, 4–6 cm. or more; petioles 5–10 mm. long; leaflets round-oblong or sub-orbicular, 1.5–3 cm. long, 1.5–2.5 cm. broad, retuse; finely appressed silky-pubescent above, appressed silky-villous and paler beneath; racemes several, fascicled in the axils of the leaves, forming conspicuous clusters at the slightly enlarged nodes; flowers pale lilac purple, 1.5 cm. long, solitary or two together, scattered along nearly the whole length of the somewhat flexuous rhachis; bracts minute; bracteoles 1 mm. long, subulate, acuminate, close to the base of the calyx; calyx 8 mm. long, clothed with short, white, silky hairs, the lobes acuminate, the upper one apparently entire, the middle lower one the longest; vexillum 1.5 cm. long, oblong-obovate, tapering to the base of the claw, obtuse or acutish at the apex, the wings very slender; authers linear-oblong, obtuse. Legume not seen.

Conspicuous for its roundish leaflets, and its numerous fascicled often branched and flexuous racemes.

Type, Nash, no. 2480 in Herb. Columbia College, from Tampa, Florida.

7. **Galactia canescens** (Scheele) Benth. Ann. Wien. Mus. 2: 126. 1838.

Prostrate, creeping on the ground, canescent throughout, many of the racemes becoming subterranean and bearing globular 1-seeded pods: stems several from the same slender, ligneous root, branched at the base; stipules 1–2 mm. long, subulate; internodes 1–15 cm. long; petioles 3–7 cm. long; leaflets 2–4 cm. long, 1.5–3 cm. wide, broadly ovate or oval, retuse, thick and coriaceous, slightly hirsute above, silky canescent-pubescent, much whiter and the veins reticulated beneath; peduncles slender, elongated, few-flowered; bracts and bracteoles minute, subulate;

calyx silky-hirsute, the teeth acuminate; corolla rose-purple?; vexillum obovate; subterranean pods 8 mm. long and broad, reticulated, emarginate, appressed-hirsute, the seeds 6 mm. long, 4 mm. wide, ovoid-elliptical, slightly rounded at the ends, light brown, the other pods 2–3 cm. long, 6–7 mm. wide, linear-oblong, acute, tapering to the base, densely pubescent or tomentose, the seeds elliptical-oblong, mature ones not seen.

Original locality, Texas.

Type, Lindheimer, No. 370.

Sandy ground, Texas.

SYNONYMY: *Heterocarpaea Texana* Scheele, Linnaea **21**: 468. 1850.

8. **Galactia Texana** (Scheele) A. Gray, Bost. Journ. Nat. Hist. **6**: 170. 1850.

Procumbent from a ligneous root; stems slender, long, conspicuously twining, retrorse-pubescent or hirsute; stipules minute, caducous; petioles 1–4 cm. long, slender; leaflets 2.5–5 cm. long, 2–3.5 cm. wide, oval, retuse, mucronulate, minutely appressed-cinereous-puberulous or glabrate above, appressed sericeous or sparingly villous beneath, thin, becoming slightly coriaceous; racemes few-flowered, much shorter than the leaves; flowers not seen; calyx 5 mm. long, the teeth attenuate; legume slightly falcate, 4–5 cm. long, 5–6 mm. wide, acute at each end, appressed-hirsute; seeds 5–7, 5 mm. long, elliptical, truncate at the ends, light brown.

Original locality, near New Braunfels, Texas.

Type, Lindheimer. Confined to Western Texas.

SYNONYMY: *Lablab Texanus* Scheele, Linnaea, **21**: 467. 1848.

9. **Galactia regularis** (L.) B. S. P. Prel. Cat. N. Y. 14. 1888.

Prostrate and climbing on bushes, from a stout, ligneous root; stems 4 dm.–1 m. long or more, terete, minutely retrorse-pubescent, becoming glabrate; internodes about the length of the leaves; stipules minute, subulate; petioles 1–3 cm. long; leaflets 2–4.5 cm. long, rather rigid, elliptical-oblong, or ovate-oblong, obtuse, rarely acutish, often retuse and apiculate, emarginate, glabrous above, somewhat appressed-hirsute or pilose and lighter beneath; racemes 3–9 cm. long, usually rigid, and, with the leaves erect on the prostrate stem, the smaller accessory ones only occasional; flowers violet-purple, showy, often scattered the whole length of the rhachis; bracts small; bracteoles subulate, 1–2 mm. long; calyx 6–9 mm. long; glabrate or with a few scattered hairs conspicuously acuminate in bud, the teeth slender, obscurely scarious-margined, the upper broader one entire; vexillum obtuse or acutish, tapering to the flat claw, with an obscure, brownish spot below the middle; anthers linear-oblong, acute at each end; legume 3.5 cm. long, 4–5 mm. wide, linear, acutish at each end, appressed-hirsute, becoming glabrate; seeds about 3 mm. long, oblong-orbicular, brown. June–August.

Original locality, Virginia.

Type, in Herb. Mus. Brit.

Pine barrens and sandy woods, Southern New York to Florida and Mississippi.

SYNONYMY: *Dolichos regularis* L. Sp. Pl. 726. 1753.
Ervum volubile Walt. Fl. Car. 187. 1788.
Galactia glabella Michx. Fl. Bor. Am. 2: 62. 1803.
Galactia Purshii Desv. Ann. Sci. Nat. 9: 413. 1826.

ILLUSTRATIONS: Hill, Veg. Syst. 21: *pl. 19.* 1772.

A slender, smaller leaved form of this species has been collected at Aiken, S. C., by H. W. Ravenel.

10. * **Galactia volubilis** (L.) Britt. Mem. Torr. Club, 5: 208. 1894.

Prostrate and climbing on bushes, from a slender, ligneous root; stems 4 dm.–1 m. or more long, retrorsely and finely hirsute; stipules minute, subulate; petioles 1–5 cm. long; leaflets 2–5 cm. long, ovate-oblong or rarely lanceolate-oblong, obtuse, often retuse, mucronulate, rarely acutish, glabrous or somewhat pilose above, lighter, minutely pubescent or pilose beneath; racemes 2 or 3 cm.–2.4 dm. long, often slender and filiform; flowers 8–10 mm. long, lilac or pink-purple; bracts and bracteoles minute; calyx 6–8 mm. long, attenuate in bud, glabrate or somewhat pilose, the lobes nearly equal, slender; vexillum obovate, rounded above, biappendiculate at the base, claw slender; legume 3–5 cm. long, 4–5 mm. wide, acute at each end, linear or linear-oblong; seeds 6–9, when mature nearly as wide, truncate at each end, brown, with black markings. May–August.

---

* This species is based on the Dillenius plate cited below and is most variable and difficult to define. The type specimen is evidently the larger leaved, long-racemed form that occurs principally from North Carolina to Florida on the coast, and has been confounded with *G. mollis* Michaux. The more northern plant has usually shorter racemes, the upper part of which often falls off before maturity of the fruit, which gives the appearance of very short, sometimes sessile racemes. It has in its more southern limits been confounded with *G. tenuiflora* (Willd.) Wight and Arn. An original type specimen of Wight Nos. 874 and 875 from Colemala, East Indian Peninsula preserved in Herb. Columbia College differs materially from the North American plant. *G. tenuiflora* occurs in South America and is referred in Index Kewensis to *G. dubia* DC. Prod 2: 238. *Galactia Macreei*, the type specimen of which is preserved in Herb. Columbia College, is merely a very slender filiform-racemed variation.

Original locality, "America Septentrionali."

Long Island to Florida, west to Pennsylvania, Tennessee and Texas.

SYNONYMY: *Hedysarum volubile* L. Sp. Pl. 750. 1753.

Galactia mollis Nutt, Gen. 2: 117. 1818. Not Michaux.

Galactia pilosa Ell. Bot. S. C. & Ga. 2: 238. 1824. Not Nuttall.

Galactia Macreei M. A. Curtis, Bost Journ. Nat. Hist. 1: 120. 1837.

Galactia villosa Eat. & Wright, N. Am. Bot. 248. 1840. Not Wight & Arnott.

ILLUSTRATIONS: Dill. Elth. 173. *pl. 43. f. 170.* 1732.

Hill, Veg. Syst. 21: *pl. 43. f. 4.* 1772.

10a. Galactia volubilis Mississippiensis n. var.

Leaflets oval or oval-oblong, pilose on both surfaces, lighter beneath, mostly retuse; racemes slender, varying in length; flowers slightly smaller, pale lilac; legume 3–4 cm. long. Otherwise as in the type.

Missouri, Arkansas, Indian Territory and Louisiana.

An oval, pilose-leaved form that in Missouri seems very distinct, but specimens from other localities seem to intergrade with the broader leaved form of the type.

10b. Galactia volubilis intermedia.

Very slender; leaflets linear or linear-oblong; racemes filiform, the flowers on the upper portion often sessile in the axils of the leaves; legume 2–3 cm. long.

Florida to Louisiana.

SYNONYMY: *Galactia pilosa γ angustifolia* Torr. & Gray, Fl. N. Am. 1: 287. 1838. Not *G. angustifolia* Kunth.

A very slender form, intermediate between the type and *G. angustifolia* Kunth, or what passes as such.

11. **Galactia mollis** Michx. Fl. Bor. Am. 2: 61. 1803.

Prostrate or climbing, villous and somewhat hoary throughout; stems several from the same slender root, simple or branched; the racemes and petioles mostly erect on the decumbent stems; stipules subulate 1–2 mm. long; petioles 2, rarely 5 cm. long; leaflets 2.5–5 cm. long, oval or oblong, obtuse or emarginate at both ends, sometimes retuse, the upper ones often acutish, bright, light green, scabrous and villous above, villous and paler beneath, the young ones densely tomentose, the lateral ones usually rounded at each end, the terminal one more tapering at the base; racemes solitary 1–2 dm. or more long; flowers acute in the bud, bright red or rose-purple, short pedicelled, approximated near the summit of the short peduncle, bracts setaceous. minute, bracteoles subulate, 1.5 mm. long; calyx about 6 mm. long, densely villous, the broader upper tooth entire, nearly equalling the more slender lower ones; vexillum obovate, rounded above, tapering to the obscurely biappendiculate base, keel-petals paler in color and considerably smaller than the slender wings; legume 2.5–3.5 cm. long, 4.5–5.5 mm. wide, linear-oblong, acutish, densely tomentose; seeds ovoid, acutish, brown. July–August.

Original locality, "Carolina inferiore."

Type, in Herb. Michaux.

Dry, sandy pine lands and swamps, North Carolina to Florida.

SYNONYMY: *Galactia pilosa* Nutt. Gen. 2: 116. 1818. Not Elliott.

A very slender form of the above species with narrower leaflets, which are obscurely scabrous or glabrate above and less villous beneath, occurs in Florida.

12. **Galactia Cubensis** H. B. K. Nov. Gen. 6: 429. 1823.

Climbing high on shrubs and trees; stems terete, retrose-pubescent, becoming often nearly glabrate; stipules 2–3 mm. long, subulate; petioles 1–3 cm. long; stipels 2 mm. long, setaceous, 2 mm. long, often persistent; leaflets 2.5–8 cm. long, oblong, oblong-oval or elliptical, obtuse and emarginate at both ends, thick, rigid and coriaceous, glabrous and finely reticulated above, pubescent, paler and reticulated beneath; racemes mostly longer than the leaves, 5 cm.–1.4 dm. long; flowers 10–12 mm. long, pale purple, sessile or nearly so, solitary or two, opposite at regular intervals often the whole length of the rhachis; calyx 5–6 mm. long, the lobes attenuate, pubescent; vexillum obovate; legume 4–5 cm. long, 5–6 mm. or more wide, acutish, hirsute, at length glabrate, the conspicuous, raised sutures glabrous; seeds 6–10, 3–4 mm.

long, oblong, ovoid, brown, mottled with black. Very variable. March–December.

Original locality, near Havana, Cuba.

Keys, Florida, West Indies; also in Central America.

SYNONYMY: *Galactia spiciformis* T. & G. Fl. N. Am. 1: 287. 1838.

13. **Galactia Wrightii** A. Gray, Pl. Wright. 1: 44. 1852.

Sub-erect or decumbent; stems several from the same lignescent root, branched from the base, cinereous with a fine, white, appressed, retrose pubescence; stipules 1–2 mm. long, subulate or setaceous; petioles 1–4 cm. long; leaflets oblong or oblong-linear, 2–5 cm. long, obtuse, mucronulate, less canescent above than beneath, rarely becoming glabrate above; racemes many-flowered, 5–15 cm. long, the lower ones longer than the upper ones; flowers purplish, about 1 cm. long, sessile or nearly so, 2–3, fascicled at mostly regular intervals along the upper portion of the rhachis; calyx 5–7 mm. long, sericeous, the lobes acute, the middle lower one attenuate and longer; vexillum 7–10 mm. long, obovate, retuse, tapering to the biappendiculate base; legume 3–4 cm. long, 4 mm. wide, sericeous, acute at each end, 4–7 seeded. Mature seeds not seen. July–October.

Original locality, Hills near Limpia, Texas.

Type, Wright No. 111. 1849.

Extreme western Texas and adjacent New Mexico and Mexico.

SYNONYMY: *Galactia tephrodes* A. Gray, Pl. Wright. 2: 34. 1853.

14. **Galactia Elliottii** Nutt. Gen. 2: 117. 1818.

Prostrate and climbing high on brushes; stems branched, 1–3 m. long, from a long, branched, lignescent rhizome, angled, channelled, striate and somewhat retrorse-hirsute; stipules minute, subulate; petioles 2-5 cm. long; leaflets 2–3 cm. long, elliptical-oblong, obtuse, somewhat retuse, mucronulate, coriaceous, glabrous and shining above, pubescent beneath; racemes longer than the leaves, 1–3 dm.; flowers 10–12 mm long, white, tinged with red, 2 or 3 together, fascicled at regular intervals along the upper part of the rhachis; bracts and bracteoles minute; calyx about 7 mm. long, appressed-hirsute, the lobes slender, attenuate, vexillum obovate, obtuse or acutish, obscurely biappendiculate at the base; legume 3–4 cm. or more long, 1 cm. wide, oblong, acutish, emarginate, tomentose; seeds 3–5, about 5 mm. long, ovoid, blackish, smooth and shiny.

Original locality, South Carolina.

Dry soil and pine lands, South Carolina to Florida, near the coast.

SYNONYMY: *Galactia pinnata* Muhl. Cat. 65. 1813. Not Persoon, 1807.

Tephrosia Elliottii Benth. Ann. Mus. Wien 2: 127. 1838.

14a. **Galactia Elliotti Leavenworthii** Torr. & Gray. Fl. N. Am. 1 : 687. 1838.

Silky pubescent or villous throughout.

Type in Herb. Columbia College.

Florida, Leavenworth; Lake Co., Nash.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE.—No. 84.

New or Noteworthy American Grasses.—II. and III.

BY GEORGE V. NASH.

[Reprinted from The Bulletin of the Torrey Botanical Club, Vol. 22, No. 12, Dec., 1895.]

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 22, No. 11, Nov., 1895.]

New or Noteworthy American Grasses.—II.

By GEO. V. NASH.

SPOROBOLUS ASPER (Michx.) Kunth. Enum. 1: 210. 1833.

Agrostis aspera Michx. Fl. Bor. Am. 1: 52. 1803.

Vilfa Drummondii Trin. Mem. Acad. St. Petersb. (VI.) Sc. Nat. 4: Botanique, 106. 1845.

Sporobolus asper var. *Drummondii* Vasey, Contr. U. S. Natl. Herb. 3: 60. 1892.

This grass and the next seem to have been confused. The plant named *S. asper* by Dr. Vasey is the *Agrostis longifolia* Torr., and not the *A. aspera* of Michaux, who apparently had in mind, so far as can be determined from his short description, the form with a long palet. The plant of Michaux, as here understood, has a long-acuminate, sometimes almost awned, palet, which usually much exceeds the scale; the outer scales narrow and acute; the culm and panicle, which is generally exserted, quite slender.

Grows from Delaware to Illinois and Missouri, south to Florida and Texas.

Vilfa Drummondii Trin. may eventually be separated as distinct, but at present it seems preferable to refer it to this species, intermediate forms being very numerous and apparently connecting the two.

SPOROBOLUS LONGIFOLIUS (Torr.) Wood, Class-book, 775. 1861.

Agrostis involuta Muhl. Gram. 72. 1817. Not Poir. 1810.

Agrostis longifolia Torr. Fl. 90. 1824.

Vilfa Hookeri Trin. Mem. Acad. St. Petersb. (VI.) Sc. Nat. 4: Botanique, 106. 1845.

Sporobolus asper Vasey, Contr. U. S. Natl. Herb. 3: 59. 1892. Not Kunth. 1833.

This is usually a more robust plant than the preceding. The panicle is generally more or less included in the upper sheath, sometimes merely protruding from the sheath fissure. The spikelets are wider, with broad, obtuse scales and palet, the latter about equalling the third scale.

Occurs from Maine to Illinois and Kansas, south to Long Island, Tennessee, Mississippi and Texas.

SPOROBOLUS VAGINAEFLORUS (Torr.) Wood, Classbook, 775. 1861.

Vilfa vaginaeflora Torr. A. Gray, Gram. & Cyp. No. 3. 1834.

Sporobolus minor Vasey; Wats. & Coult. in A. Gray, Man. Ed. 6, 646. 1890. Not Kunth 1833.

Sporobolus filiculmis L. H. Dewey, Contr. U. S. Natl. Herb. **2**: 519. 1894.

The type of this plant, as indicated in A. Gray, Gram. & Cyp., is the form with long and narrow spikelets, the scales narrow and acuminate. Dr. Vasey took up and named as *S. vaginaeflorus* the form with shorter and broad spikelets, the scales merely acute. This plant is considered below.

SPOROBOLUS NEGLECTUS nom. nov.

Sporobolus vaginaeflorus Vasey, Wats. & Coult. in A. Gray, Man. Ed. 6, 645. 1890. Not Wood. 1861.

This is the plant that has long passed as *Vilfa vaginaeflora* Torr., but it is not the same, as indicated under the preceding species. Owing to this mistaken identity this plant appears to be without a name, and so the one given above is proposed. The broader and shorter spikelets, with the scales broad and merely acute, will readily separate this plant from the *S. vaginaeflorus* Wood.

In the vicinity of New York it is much less common than *S. vaginaeflorus*, which grows plentifully in many localities.

Dry sandy soil, Massachusetts to Kentucky, Tennessee and Kansas.

SPOROBOLUS BREVIFOLIUS (Nutt.) Scribn. Mem. Torr. Bot. Club. **5**: 39. In part. 1894.

Agrostis brevifolia Nutt. Gen. **1**: 44. 1818.

There seems to be much confusion in regard to *Sporobolus depauperatus* and *S. cuspidatus*. Forms of what appears to be a good species have been variously referred to either of the above. They agree well with the description of *Agrostis brevifolia* Nutt., and they are here referred to that species. The leaves are short, 1′–2′ long; the empty scales obtuse or merely abruptly acute, less than one-half as long as the acuminate and sometimes short-cuspidate flowering scale.

Grows from Anticosti Island and Maine to British Columbia, south in the mountains to New Mexico and California.

S. depauperatus (Torr.) Scribn. is a plant of the extreme northwest, occurring in Washington and Oregon, possibly extending southward in the mountains. The culms are short and decumbent, the internodes very short, usually ½′ long or less, the nodes often swollen; the empty scales broad, thin, white, delicate in texture, obtuse or acutish, more than one-half the length of the broad flowering scale, sometimes about equalling it.

In *S. cuspidatus* (Torr.) Wood the empty scales are acuminate and short-awned, more than one-half as long as the acuminate and awn-pointed narrow flowering scale. The plant is usually taller and has much longer leaves than either of the two species above mentioned, and ranges from Manitoba to the Northwest Territory, Missouri and Kansas.

ERAGROSTIS TRICHODES (Nutt.).

Poa trichodes Nutt. Trans. Am. Phil. Soc. 5: 146. 1833–37.

Eragrostis Geyeri Steud. Syn. Gram. 272. 1855.

Eragrostis tenuis A. Gray, Man. Ed. 5, 632. 1867. Not Steud. 1855, nor *Poa tenuis* Ell. 1817.

Nuttall's name for this plant is the oldest, and is here taken up. This grass extends from Illinois westward and southwestward, and is not known to occur in South Carolina or Georgia, the region covered by Elliott's Botany. It could hardly, therefore, be the same as the *Poa tenuis* of that work, which, according to a specimen of that plant in the Columbia College Herbarium, labeled as coming from Elliott, is apparently the same as the grass now known as *Eragrostis capillaris* Nees, and which well accords with the description given by Elliott of his *Poa tenuis*.

POA BUCKLEYANA nom. nov.

Poa tenuifolia Buckley, Proc. Acad. Phila. **1862**: 96. 1862. Not A. Rich. 1851.

No other name for this plant can be found, and so the above is given it in honor of Dr. S. B. Buckley, who first published a description of it.

New or noteworthy American Grasses.—III.

By Geo. V. Nash.

Eatonia nitida (Spreng.).

Aira nitida Spreng. Fl. Hal. Mant. 1: 32. 1807.

Aira Pennsylvanica Spreng. Mem. Acad. St. Petersb. 2: 299. *pl.* 7. 1810.

Aira mollis Muhl. Gram. 82. 1817.

Eatonia Dudleyi Vasey, Coult. Bot. Gaz. 11: 116. 1886.

Sprengel in his description of *Aira nitida* describes the leaves as 1′ long and pubescent at the base. These are characters which are peculiar to the plant known as *Eatonia Dudleyi* Vasey, which is very common in Pennsylvania, the region from which Sprengel's plant came. The *Aira Pennsylvanica* Spreng. is certainly the *Eatonia Dudleyi* Vasey. The figure cited above well represents this species.

The more prominent characters which appear to separate this plant from the *Eatonia Pennsylvanica* (DC.) A. Gray, are: The almost constant pubescence of the sheaths, at least the lower ones; the slender culm; the short, often pubescent leaves; and the broader first scale, which is about one-third the width of the second.

Puccinellia airoides (Nutt.) Wats. & Coult. in A. Gray, Man. Ed. 6, 668. 1890.

Poa airoides Nutt. Gen. 1: 68. 1818.

Glyceria distans var. *airoides* Vasey, Cat. Grasses U. S. 87. 1885.

Panicularia distans airoides Scribn. Mem. Torr. Club, 5: 54. 1894.

This plant appears to be specifically distinct from the *P. distans* Parl. The taller and more slender culms, the panicle-branches dividing nearer the extremities, the fewer and less crowded spikelets, and the comparative length of the empty and flowering scales serve well to distinguish it. In *P. distans*, a coast plant, the second empty scale is less than one-half as long as the flowering ones; while in *P. airoides*, a plant of the western interior, it exceeds one-half the length of the flowering scales.

PUCCINELLIA ANGUSTATA (R. Br.).

Poa augustata R. Br. App. Parry's Voy. 287. 1824.

Glyceria angustata Fries, Mant. 3: 176. 1842.

Panicularia angustata Scribn. Mem. Torr. Club, 5: 54. 1894.

BROMUS PORTERI (Coulter).

Bromus Kalmii var. *Porteri* Coulter, Man. Rocky Mt. Region, 425. 1885.

Culms 1½°–3° tall, erect, simple, pubescent below the nodes. Sheaths shorter than the internodes, glabrous or sometimes softly pubescent; ligule ½″ long, truncate; leaves 1″–3″ wide, rough, those of the culm 4′–9′ long, the basal narrow and about one-half of the length of the culm; panicle 3′–6′ in length, its branches drooping and flexuous, at least when old, the nodes of the axis pubescent; spikelets 5–10-flowered, 9″–15″ long, on slender flexuous pedicels; empty scales pubescent, the first narrower than the second, both 3-nerved; flowering scales 5″–6″ long, obtuse, 5–7 nerved, densely pubescent with long silky hairs; awn 1″–2″ long.

In dry soil, South Dakota to Montana, south to western Nebraska, New Mexico and Arizona.

This plant is readily distinguished from *B. Kalmii* by its 3-nerved second scale and longer flowering scales. In *B. Kalmii* the second scale is 5–7-nerved and the flowering scale about 4″ long.

CONTRIBUTIONS FROM THE HERBARIUM OF COLUMBIA COLLEGE No.—85.

Two new Genera of Saxifragaceae.

BY JOHN K. SMALL.

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 23, No. 1, Jan., 1896.]

Two new Genera of Saxifragaceae.

By John K. Small.

(Plates 256, 257.)

In the course of a study of the genus *Saxifraga*, several species now referred to it appear to be erroneously so placed. Repeated attempts to retain them where they were originally placed, or to transfer them to related genera have proved fruitless, and I confidently propose the two new genera here to be described.

Dr. Torrey remarks on *Saxifraga Parryi*, in the Botany of the Mexican Boundary Survey and others elsewhere to the same effect, that it is "a remarkable species, with the calyx and habit of a small *Heuchera*, but it is decandrous and the ovary is wholly free as well as two-celled." I make this species the type of a new genus.

JEPSONIA.

Slender acaulescent slightly pubescent herbs, perennial by corms. Leaves (usually vernal) all basal, suboricular in outline, cordate, petioled, slightly lobed and toothed; scapes (usually autumnal) wiry, simple or branched above; flowers in terminal cymes or cymose panicles; calyx campanulate with a flat base, its edge five-toothed; petals five, inserted just below the sinuses of the calyx; stamens ten, inserted on the calyx tube below the petals; filaments subulate, the alternate ones longer and slightly surpassing the calyx; ovary two-celled, free from and partially filling the calyx, its carpels united to about the middle; placenta central; follicles united at the base, tipped by the straight slender styles which diverge at an angle of about ninety degrees; stigmas peltate; seeds irregular in outline, ribbed and crested, with a pinched and curved base; embyro minute, erect in one end of the endosperm.

Leaves sub-orbicular, broader than long; calyx-teeth shorter than the tube. 1. J. Parryi.

Leaves ovate-orbicular, longer than broad; calyx-teeth as long as the tube, or longer. 2. J. malvaefolia.

1. Jepsonia Parryi (Torr.).

Saxifraga Parryi Torr. Bot. Mex. Bound. Surv. 69. *pl.* 25. 1859.

Perennial by an ovoid fleshy corm, scapose, wiry, sparingly pubescent throughout. Leaves (appearing in the spring) all basal, suborbicular in outline, 2–2.5 cm. in diameter, cleft into seven crenately toothed crenate lobes, cordate, slightly pubescent on both surfaces, on petioles about equalling the blade; scapes (appearing in late summer or fall) usually two or four together, rarely solitary, erect, 4–25 cm. tall, simple or branched above; flowers few in a terminal cyme or cymose panicle; calyx campanulate with a truncate base, 4–6 mm. high, marked with ten brown branching nerves, its five triangular obtuse teeth about one-half as long as the tube; petals white with brownish or purple nerves, elliptic-oblong or elliptic-lanceolate, sometimes nearly ovate, 4–6 mm. long, about as long as the calyx, obtuse; stamens ten, the alternate ones longer, inserted on the calyx-tube above the middle (below the petals); filaments slender, subulate; follicles 7–9 mm. long, united at the base, the body nearly included in the calyx, the slender tips surpassing the calyx and diverging at right angles; seeds small, dull-brown, 1 mm. long, irregularly oblong, provided with two ribs and two crests. (Plate 256, copied from Bot. Mex. Bound. Survey.)

Original locality, "Dry Hills near San Diego and San Luis Rey, California." Found later near San Diego (Orcutt, 1885); Ione, Amador County (Parry, 1887). Flowering in November and December.

2. JEPSONIA MALVAEFOLIA (Greene).

Saxifraga malvaefolia Greene, Bull. Torr. Club, 19: 121. 1882.

Original locality, "Santa Rosa Island." Found later on Santa Cruz Island.

These two remarkable plants form a very distinct and natural genus. They are strikingly different from any species of *Saxifraga* in habit and the flower affords good characters. The calyx is simply toothed instead of cleft or parted, the petals and stamens are inserted in the upper part of the calyx-tube and not down where the ovary and calyx meet. The ovary fills but a small part of the calyx-tube and its stigmas are peltate and conspicuous, opposed to the capitate and inconspicuous ones in *Saxifraga*, the seed with its pinched and twisted base, its ribs and crests, has no parallel in related genera.

SAXIFRAGOPSIS n. gen.

Low caulescent caespitose, sparingly glandular-pilose plants perennial by woody rootstocks. Stems straw-like, rather slender not fleshy, sparingly leafy; leaves alternate, membranous the blade articulated to the petiole and not decurrent;

petiole wiry, dilated into a scarious ribbed base; inflorescence consisting of a terminal thyrsoid-panicle, its cymnes peduncled; subtended by small bracts; pedicels usually bearing several opposite or nearly opposite bractlets below the flowers; flowers white, rather crowded; calyx hemispheric, its tube ribbed ,united to the ovary, its segments five, unequal in size and shape, reflexed; petals five, inserted just below the sinuses of the calyx tube, long-clawed, at length deflexed; stamens ten, converging; filaments inserted at the bases of the calyx segments, dilated below into two thin wings; anthers ovoid-sagitate or broadly-oblong-sagitate, four-angled especially when old; ovary very short when young, soon elongating, immersed in a red glandular disk; placenta central; follicles slender, the bodies united, the tips erect; seeds minute, smooth, somewhat curved.

1. SAXIFRAGOPSIS FRAGARIOIDES (Greene).

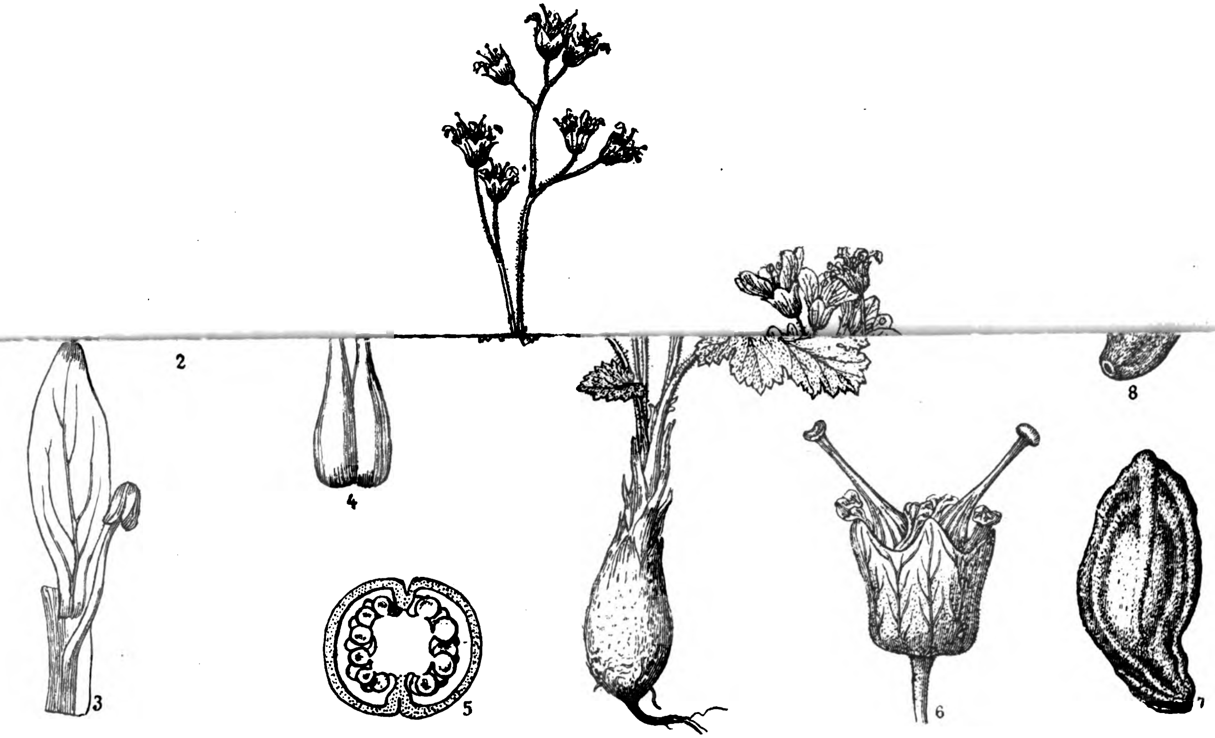
Saxifraga fragarioides Greene, Bull. Torr. Club, **8**: 121. 1881.

Rootstock horizontal, stout, woody, 1-15 cm. long, covered by the dilated, membranous bases of old petioles; stems somewhat scape-like, erect or ascending, 1-3 dm. high, strict or flexuous above, bearing several leaves which are smaller but otherwise similar to the lower ones; leaves thin, cuneate or cuneate-obovate, 1–5 cm. long, rounded and coarsely toothed at the apex entire below the middle, sparingly ciliate, dark green above, paler beneath, marked with several palmately radiating nerves, obtuse at the base, on slender petioles 2–3 cm. long, flowers greenish, 6 mm. broad, in dense panicled cymules whose branches are subtended by linear entire or toothed bracts; calyx hemispheric, its tube united to the overies, its segments longer than the tube or at length shorter, ovate, ciliate, obtuse, reflexed when dry; petals oblong-spatulate or spatulate, persistent, 1/3 longer than the sepals; at length reflexed; filaments filiform-subulate; follicles narrowly conic, 6–7 mm. high, red, united only 1/3 from base, the summits erect; seeds oblong or obvoid, .5 mm. long, smooth. (Plate 257.)

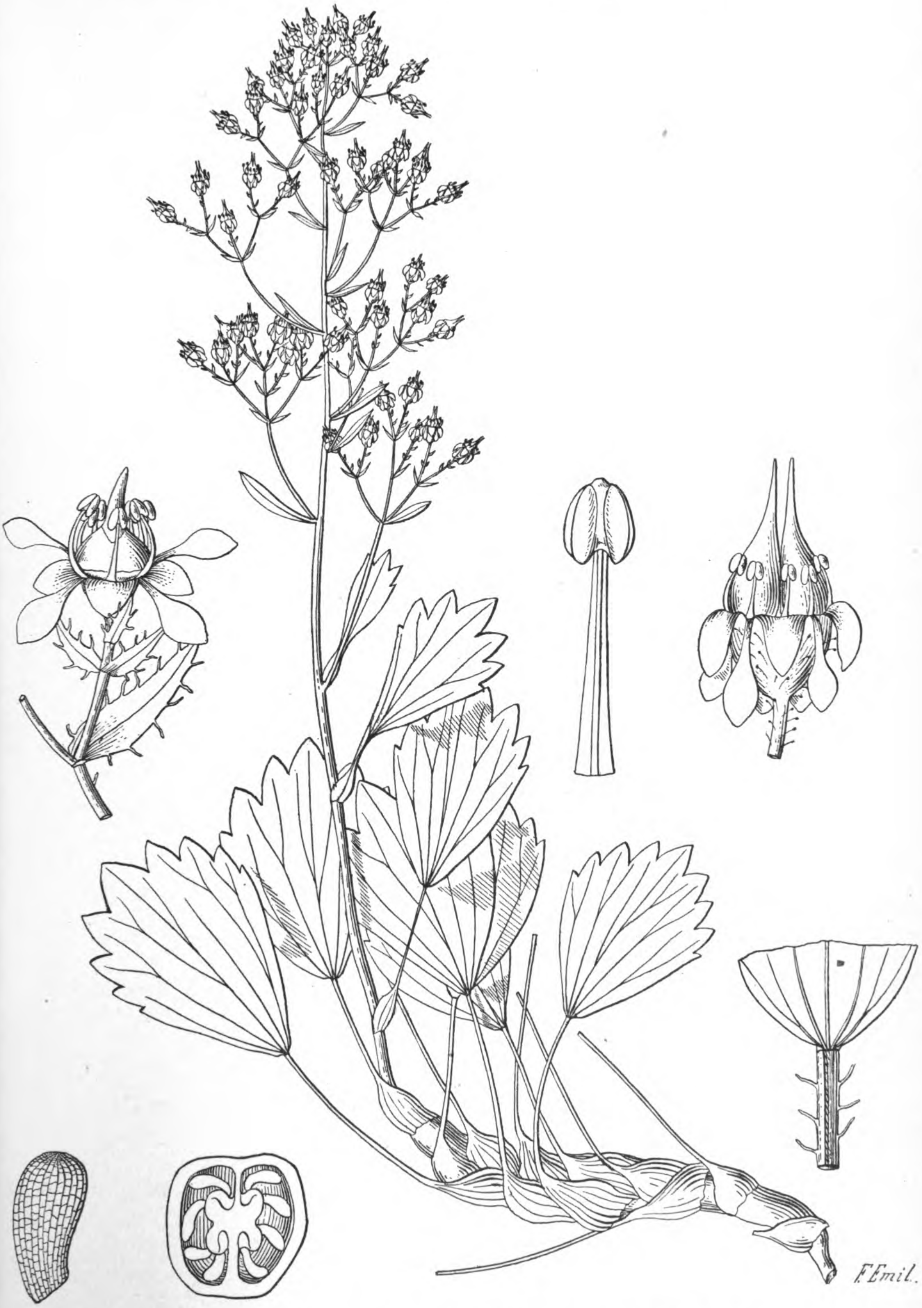
Original locality, "High mountains west of Mt. Shasta, California."

High altitudes in the mountains of Northern California and Southern Oregon; Cliffs overhanging Castle Lake, Siskyiou county, California and top of the Siskyiou Mountains near Waldo, Oregon.

BULLETIN OF THE TORREY BOTANICAL CLUB.—PLATE 256.



JEPSONIA PARRYI (TORR.) SMALL.



SAXIFRAGOPSIS FRAGARIOIDES (GREENE) SMALL.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE No.—86.

Carex vulpinoidea Michx. and allied Species.

BY E. P. BICKNELL.

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 23, No. 1, Jan., 1896.]

Carex vulpinoidea Michx. and allied Species.

By E. P. Bicknell.

A careful study of *Carex vulpinoidea* Michx., continued from the field into the herbarium, has made it plain to me that this species, as accepted, is a composite one, embracing at least three or four distinct plants on our eastern seaboard alone. One of these plants is an old species, here revived—the *Carex setacea* of Dewey, which I am satisfied should never have been discredited; it will be recalled that it was endorsed by Dr. Torrey. The other two seem never to have been distinguished, and reference to all the citations in the published synonomy of *C. vulpinoidea* discovers no name applicable to either.

CAREX VULPINOIDEA Michx.

Culm 1½°–2½° tall (1°–3°), sharp-angled, very scabrous on the angles above, or throughout, leafy. Leaves long and narrowly attenuate, mostly exceeding the culm, 1°–2° long, 1″–2″, sometimes 2½″ wide, often somewhat appressed and crowded. Head at maturity greenish or dull brown, narrow, commonly 1½′–3′ long, 2″–3″ wide, the spikelets below either in contiguous or separated compound clusters or in short, appressed or ascending densely-flowered branches which often appear like oblong or linear spikes; larger spikelets narrowly oblong, the smaller subglobose. Small forms of the plant show the spikes aggregated into linear heads only 1½′–2′ long; in more attenuate forms the heads may be much interrupted and elongated, even slender and inclined, reaching a length of six inches, the lower branches an inch or more distant on the rachis. Occasionally in stout forms the head is much congested throughout and 4″–6″ wide; rarely it is looser and bears at the base closely compound ascending branches an inch in length. All the clusters of the head are subtended by setaceous, often flexuous bracts, the lowermost usually well-developed and elongated, even 8′ long. Perigynia very small, numerous, loosely spreading, the conspicuous points often somewhat recurved, at maturity greenish or pale brown, sometimes yellowish-brown, membranous, flattish, mostly distinctly few-nerved on the outer face, frequently nerveless on inner face, ovate, often from a dilated or sub-cordate base, acuminate into a mostly slender, smooth to serrulate-hispid, sharply-toothed beak which usually equals or nearly equals the body of the perigynium; body of perigynium ½″–¾″ long and wide, more or less corky in the margins basally or at the sides. Achene broadly ovate-oblong, small, ½″ or less long. Scales small, whitish with a green keel, becoming pale dull brown or sometimes yellowish-brown, little noticeable in the spikelet excepting their awns which, though not usually conspicuous, are evident and, with their spreading points of the perigynia, give the heads a sharply roughened appearance.

In low grounds and meadows, and along ditches, often growing in dense tufts. Canada to Florida and Texas, west at least to Minnesota and Kansas.

CAREX XANTHOCARPA n. sp.

Culm longer and often stouter than in *C. vulpinoidea*, 1½°–4° tall (1°–5°), much exceeding the leaves, scabrous on the angles above, very smooth and bluntly triangular or even subterete below. Leaves fewer and less crowded and appressed than in *vulpinoidea*, mostly under 1° long, rarely 1½°, 1½″–3″ wide. Head early yellowish or tawny, narrowly oblong, sometimes ovoid, mostly dense and uninterrupted, ¾′–2¼′ long, 3″–6″ wide, the spikes closely glomerate-subcompound throughout, or the lowermost more distinctly compound and looser, but not separated, forming ovoid, somewhat spreading clusters. Bracts mostly short and inconspicuous, the lowermost not often noticeably developed. Spikes plump, ovoid, densely many-flowered, the perigynia ascending, often slightly incurved, finally somewhat spreading, becoming bright yellow, markedly plano-convex and narrowly sharp edged, mostly ovate-elliptic from a cuneate pointed base, or sub-rhomboidal (those low in the spikes sometimes with a broader, more abrupt base), nearly beakless, or graduated into a short, very rough-margined, minutely two-toothed beak. Walls of the perigynium thickish and subcoriaceous, but not corky-thickened in the margins, either nerveless or obscurely few-nerved on the somewhat turgid outer face, often with a median ridge on the flat inner face; body of perigynium about twice as large as in *vulpinoidea*, 1″ or more long, 1″ or less wide. Achene broadly oblong, about ¾″ long. Scales longer than in *vulpinoidea*, but shorter awned, early becoming bright tawny or yellowish-brown and very noticeable in the spikes.

Scarcely tufted, growing in low fields or in open levels on higher ground.

In the cover of *C. vulpinoidea* in the Columbia Herbarium, I find specimens as follows:

Cambridge, Mass., 1845, E. Tuckerman, Jun.

Ohio, Sullivant.

The plant is common at New York and is unmistakable when once it is understood. Not infrequently it is found growing with *C. vulpinoidea*, from which it is clearly distinct.

CAREX XANTHOCARPA ANNECTENS n. var.

Lower and more slender than *C. xanthocarpa*, 1½°–3° tall;

culms trigonous, scabrous above, smooth and sometimes subterete below, exceeding the leaves. Leaves mostly 6′–1° long, often very narrow, 1″–2″ wide. Head short, ¾′–1½′ long, 3″–4″ wide, green, varying to dull yellowish or greenish-tawny, the spikes noticeably bracteate, the lowest bract frequently exceeding the head. Spikes globose to ovoid-oblong, mostly distinct and loosely aggregated below the apex of the head, or the lowest, or lower two or three, slightly separated, either all simple and distinct or the lower subglomerate with smaller spikelets at their bases. In small forms the head may consist of only 6–8 globose more or less distinct spikes. Spikes relatively few-flowered, the perigynia finally loosely spreading, mostly exceeded by the awns of the scales, which gives the head a somewhat bristly appearance. Perigynia dilated-ovate or suborbicular (rarely narrower) mostly from a broad base, narrowed or abruptly contracted to the short rough-margined beak, sometimes slightly corky in the edges, few-nerved in the middle of the outer face, often broader than long, the body 1″ or more broad, 1″ or less long. Achene broadly ovate-oblong or suborbicular, nearly truncate at base, ½″ or more wide.

About damp thickets in low grounds and in moist woods.

Common at New York. In the Columbia College Herbarium are specimens from Staten Island (Britton) and North Carolina (Curtis).

In the present state of our knowledge of it this is a very puzzling plant. It has an aspect of its own, which makes it easy to recognize in the field, so far as I have observed it, yet certain herbarium specimens suggest that it shades into reduced forms of *xanthocarpa.* I have seen no specimens which were not clearly separable from *C. vulpinoidea,* although the general appearance of the head is often closely similar. Smaller forms having heads of few simple spikes sometimes bear a singularly close resemblance to *C. Mulenberghii enervis.*

The plant differs from *C. xanthocarpa* mainly in simpler, looser and more bracteate, greener heads, more loosely-flowered spikes with spreading perigynia, longer-awned, paler scales which appear more bristly in the spikes, broader and more greenish perigynium, broader achene. From *vulpinoidea* it differs in shorter leaves longer culm, shorter and simpler heads, larger and broader perigynium, with much shorter and rougher beak, larger achene.

I suspect that a better knowledge of this plant will show that it is sufficiently individualized to stand as a species.

CAREX SETACEA Dewey.

Culm 1½°–4° tall, mostly exceeding the long leaves, trigonus, often with concave sides, sharply serrulate-scabrous on the angles above, smooth below. Leaves 1°–2° long, 1′–3′ wide. Head about 2′ long (1½′–2½′), 3″–5″ wide, silvery-green to chestnut brown, mostly narrow with much broken outlines, often with short ascending branches at the base. Spikelets mostly ovoid-oblong, those terminating the branches sometimes attenuate and loosely flowered at the base, simple and crowded above, becoming somewhat alternate and glomerate-clustered or compound below, the lowest cluster sometimes separated. Head throughout either setaceously short-bracteate, the lowest bract not more prominent than those above, or all the bracts short and inconspicuous. Spikelets rather densely flowered, chaffy, the scales conspicuous, nearly concealing the appressed to subspreading perigynia. Perigynia lanceolate, graduated from a truncate base into a narrow beak, and smooth and nerveless or nearly so (*setacea*), or elliptic-lanceolate to ovate, with less abrupt base and short beak and mostly somewhat wrinkled-nerved (*C. scabrior* Sartwell), 1¼″–1½″ long, ½″–¾″ wide, the edges of the beak strongly serrulate or subaculeolate hispid. Achene larger than in *vulpinoidea.*

As compared with *vulpinoidea* the perigynium is without corky-thickened margins, and is more evenly graduated into a much rougher beak; the scales are larger, giving a chaffy appearance to the spikes, and are silvery-hyaline (*scabrior*) or becoming chestnut (*setacea*), in contrast with the smaller greenish-white or yellowish-brown scales of *vulpinoidea*, and are mostly more acuminate into a more delicate awn; the lower bract of the head is never much elongated or foliaceous, and altogether the head has a distinctly different appearance. I feel assured that a close acquaintance with this plant in life and a full series of specimens would only serve to emphasize its distinctness from *C. vulpinoidea.*

The description of *Carex setacea* here given is drawn to include the *Carex scabrior* of Sartwell. A type specimen of the latter (Carices Americae Septentrionalis. H. P. Sartwell, M. D., No. 72) is in the Herbarium of Columbia College, and the plant is well figured among Boott's illustrations of *C. vulpinoidea* (Ill. *pl. 409*). With this guidance I have been able without any hesitation to refer to *scabrior* rather than to *setacea*, a specimen collected at New York. While it would be ill advised to propose a revival of *C. scabrior* on the evidence at command, attention may well be drawn to the very probable distinctness of the two plants.

CONTRIBUTIONS FROM THE HERBARIUM OF COLUMBIA COLLEGE No.—87.

A List of Species of the smaller herbaceous Genera of North American Saxifragaceae.

By WM. E. WHEELOCK.

[Reprinted from The Bulletin of the Torrey Botanical Club, Vol. 23, No. 3, Mar., 1896.]

A List of Species of the smaller herbaceous Genera of North American Saxifragaceae.

By Wm. E. Wheelock.

In studying the herbaceous North American Saxifragaceae, it has seemed desirable to present a preliminary enumeration of the species, with their synonymy and distribution as known to me at the present time, with a view of eliciting comment and to request additional material for examination. The species of *Saxifraga* will be enumerated by Dr. Small in a subsequent contribution.

The genera have been taken up in the sequence adopted by Professor Engler, in Engler und Prantl's "Naturliche Pflanzenfamilien," and I find myself able to agree with him in most of his generic limitations.

The following key will serve to indicate these limitations.

The synonymy is given only for those species not enumerated in the "List of Pteridophyta and Spermatophyta of Northeastern North America," Mem. Torr. Club, 5: 177–180. 1894.

Staminodia wanting.
  Large herbs with 3-ternate leaves and polygamous flowers. 1. Astilbe.
  Herbs with simple cleft lobed or 3-foliolate leaves and perfect flowers.
    Leaves coriaceous; carpels distinct. 2. Leptarrhena.
    Leaves membranous, coriaceous or fleshy, carpels more or less united at the base.
      Placentae axial.
        Ovary superior or nearly so.
          Stamens five. 3. Bolandra.
          Stamens ten.

Calyx five-toothed, stamens inserted just under the sinuses. 4. JEPSONIA.
Calyx five-cleft or five-parted, stamens inserted under the ovary. 5. SAXIFRAGA.
Ovary not superior, more or less adnate to the calyx-tube.
Petals mostly deciduous; stamens five or ten; seeds ovoid, rough. 6. THEROFON.
Petals persistent.
Stamens five. 7. SULLIVANTIA.
Stamens ten.
Leaves not peltate.
Petals at length deflexed; leaves papery-membranous, the blade obscurely articulated to the petiole. 8. SAXIFRAGOPSIS.
Petals not deflexed; leaves coriaceous or fleshy, the blade more or less decurrent. 5. SAXIFRAGA.
Leaves peltate. 9. PELTIPHYLLUM.
Ovary almost entirely inferior; stamens five. 10. HEMIEVA.
Placentae almost basal. 11. TIARELLA.
Placentae parietal.
Petals present (except in some species of *Heuchera*).
Plants large, at least several centimeters high.
Petals entire, relatively small.
Stamens five. 12 HEUCHERA.
Stamens three. 13. LEPTAXIS.
Petals variously toothed, cleft, lobed or parted, or if entire relatively large; stamens five or ten.
Capsule beaked.
Corolla regular. 14. TELLIMA.
Corolla often somewhat irregular; petals sometimes entire, the upper often smaller. 15. LITHOPHRAGMA.
Capsule not beaked. 16. MITELLA.
Plants minute, about one centimeter high. 17. LEPUROPETALON.
Petals always wanting. 18. CHRYSOSPLENIUM.
Staminodia present, alternate with the stamens. 19. PARNASSIA.

1. ASTILBE Hamilt.

1. **Astilbe biternata** (Vent.) Britton, Bull. Torr. Club, **20**: 475. 1893.
Mountains of Virginia and Kentucky to Georgia and Tennessee

1*a*. **Astilbe biternata crenatiloba** (Britton).

Astilbe decandra var. *crenatiloba* Britton, Bull. Torr. Club, 15: 98. 1888.

This plant has been seen only from the original station on the slope of Roan Mountain, East Tennessee.

2. LEPTARRHENA R. Br. in Parry's 1st Voy. Suppl. cclxxiii. 1824.

1. **Leptarrhena amplexifolia** (Sternb.) Ser. in DC. Prodr. 4: 48. 1830.
Saxifraga amplexifolia Sternb. Rev. Sax. Suppl. 2. *pl. 2.* 1822.
Saxifraga pyrolifolia D. Don, Trans. Linn. Soc. 13: 389. 1822.
Leptarrhena pyrolifolia Ser. in DC. Prodr. 4: 48. 1830.
Alaska to British Columbia and Washington.

I have followed Mr. Jackson in "Index Kewensis," in giving priority to the specific name *amplexifolia* over *pyrolifolia.*

3. BOLANDRA A. Gray, Proc. Am. Acad. 7: 341. 1868.

1. **Bolandra Californica** A. Gray, Proc. Am. Acad. 7: 341. 1868.
California to Oregon.

2. **Bolandra Oregana** S. Wats. Proc. Am. Acad. 14: 292. 1879
Oregon, Washington.

4. JEPSONIA Small, Bull. Torr. Club, 23: 18. 1896.

Leaves sub-orbicular, broader than long; calyx-teeth shorter than the tube.
1. J. PARRYI.
Leaves ovate-orbicular, longer than broad; calyx-teeth as long as the tube, or longer.
2. J. MALVAEFOLIA.

1. **Jepsonia Parryi** (Torr.) Small, Bull. Torr. Club, 23: 18. 1896.
Saxifraga Parryi Torr. Bot. Mex. Bound. Surv. 69. *pl. 25.* 1859.
Middle and southern California.

2. **Jepsonia malvaefolia** (Greene) Small, Bull. Torr. Club, 23: 19. 1896.
Saxifraga malvaefolia Greene, Bull. Torr. Club, 19: 121. 1882.
Santa Rosa Island and Santa Cruz Island.

6. THEROFON Raf.

Stamens 5.
  Stipules wanting, or represented by bristles.
    Leaves 3–7-lobed or 3–7-cleft.
      East American species. 1. *T. aconitifolium.*
      West American species. 2. *T. elatum.*
    Leaves crenate-dentate or incised.
      Petals small, hardly longer than calyx-teeth; Californian species. 3. *T. rotundifolium.*
      Petals relatively large; arctic species. 4. *T. Richardsoni.*
  Stipules present, often foliaceous and conspicuous 5. *T. majus.*
Stamens 10. 6. *T. Jamesii.*

1. **Therofon aconitifolium** (Nutt.) Millsp. Bull. West Va. Agric. Exp. Sta. 2: 361. 1892.

Virginia to Tennessee and Georgia.

2. **Therofon elatum** (Nutt.) Greene, Man. 121. 1894.

Saxifraga elata Nutt.; T. & G. Fl. N. A. 1: 575. 1840.
Boykinia occidentalis T. & G. Fl. N. A. 1: 577. 1840.
Boykinia elata Greene, Fl. Francis. 190. 1891.
Boykinia Nuttallii J. M. Macoun, Can. Rec. Sci. 1895.
British Columbia to southern California.

The plant for which Mr. J. M. Macoun suggests the name *Boykinia Nutallii* does not seem to us sufficiently distinct from *B. occidentalis* T. & G. We have the form to which Mr. Macoun evidently refers even from Santa Cruz, California, but hardly hirsute. We must consider, that Mr. Nuttall was describing a *Saxifraga* when he wrote "a very remarkable robust species."

3. **Therofon rotundifolium** (Parry).

Boykinia rotundifolia Parry; A. Gray, Proc. Am. Acad. 13: 371. 1878.

Southern California.

4. **Therofon Richardsoni** (Hook.).

Saxifraga Richardsonii Hook. Fl. Bor. Am. 1: 247. 1833.
Saxifraga Nelsoniana Hook. & Arn. Bot. Beechey, 124. *pl. 29.* 1832. Not D. Don. 1822.
Hemieva Richardsoni Raf. Fl. Tell. 2: 70. 1836.
Boykinia Richardsoni A. Gray, Bot. Cal. 1: 196. 1876.
Arctic America.

5. **Therofon majus** (A. Gray).

Boykinia occidentalis var. *elata* A. Gray, Proc. Am. Acad. 8: 383, name only. 1872. Not *Saxifraga elata* Nutt. 1840.
Boykinia major A. Gray, Bot. Cal. 1: 196. 1876.
California to Oregon.

6. **Therofon Jamesii** (Torr.).

Saxifraga Jamesii Torr. Ann. Lyc. N. Y. 2: 204. 1826.
Telesonix Jamesii Raf. Fl. Tell. 2: 69. 1836.
Rocky Mountains, Montana, Dakota.

7. SULLIVANTIA T. & G.

1. **Sullivantia Sullivantii** (T. & G.) Britton, Mem. Torr. Club, 5: 178. 1894.

Ohio, Indiana, Wisconsin.

2. **Sullivantia Oregana** S. Wats. Proc. Am. Acad. 14: 292. 1879.

Sullivantia Hapemani Coulter, Bot. Gazette, 17: 421. 1892.

Oregon, Wyoming.

8. SAXIFRAGOPSIS Small, Bull. Torr. Club, 23: 20. 1896.

1. **Saxifragopsis fragarioides** (Greene) Small, Bull. Torr. Club, 23: 20. 1896.

Saxifraga fragarioides Greene, Bull. Torr. Club, 8: 121. 1881.

High altitudes in the mountains of northern California and southern Oregon.

9. PELTIPHYLLUM Engler, Nat. Pfl. Fam. 3: Abt. 2, 61. 1891.

1. **Peltiphyllum peltatum** (Torr.) Engl. Nat. Pfl. Fam. 3: Abt. 2, 61. 1891.

Saxifraga peltata Torr.; Benth. Pl. Hartw. 311. 1849.

In and near the Sierra Nevada, California.

10. HEMIEVA Raf. Fl. Tell. 2: 70. 1836.

[SUKSDORFIA A. Gray, Proc. Am. Acad. 15: 42. 1879.]

Petals short-clawed.	1. *H. ranunculifolia.*
Petals long-clawed.	2. *H. violacea.*

1. **Hemieva ranunculifolia** (Hook.) Raf. Fl. Tell. 2: 70. 1836.

Saxifraga ranunculifolia Hook. Fl. Bor. Am. 1: 246. *pl. 83.* 1833.

Boykinia ranunculifolia Greene, Fl. Fran. 190. 1891.

Suksdorfia ranunculifolia Engl. in Engl. & Prantl, Nat. Pfl. 3: 2a, 52. 1891.

British Columbia.

2. **Hemieva violacea** (Raf.).

Suksdorfia violacea A. Gray, Proc. Am. Acad. 15: 42. 1879.

Washington; Oregon.

11. TIARELLA L.

Stem a scape; or rarely bearing one small leaf.	1. *T. cordifolia.*
Stem leaf-bearing.	
Leaves triangular-cordate.	2. *T. unifoliata.*
Leaves ternately divided, or trifoliolate.	3. *T. trifoliata.*

1. **Tiarella cordifolia** L. Sp. Pl. 405. 1753.
Canada to Alabama.

2. **Tiarella unifoliata** Hook. Fl. Bor. Am. 1: 238. *pl. 81.* 1833.
Heuchera longipetala Moc. Icon. Fl. Mex. ined. *pl. 423.*
Petalosteira unifolia Raf. Fl. Tell. 2: 74. 1836.
Oregon to British Columbia.

3. **Tiarella trifoliata** L. Sp. Pl. 406. 1753.
Tiarella stenopetala Presl, Rel. Haenk. 2: 55. 1835.
Blondia trifoliata Raf. Fl. Tell. 2: 75. 1836.
Petalosteira laciniata Raf. l. c. 74. 1836.
Southern Alaska to British Columbia.

3a. **Tiarella trifoliata laciniata** (Hook.).
Tiarella laciniata Hook. Fl. Bor. Am. 1: 239. *pl. 77.* 1833.
Vancouver Island; Washington.

12. HEUCHERA L.

Since the publication of "A Descriptive List of Species of the Genus *Heuchera*," Bull. Torr. Club, 17: 191–204, 1890, the original specimen on which *H. Curtisii* A. Gray was founded has come to light. I referred this plant, with doubt, to *H. villosa* Michx., but an examination of the type shows that it is to be referred to *H. pubescens* Pursh.

13. LEPTAXIS Raf. Fl. Tell. 2: 75. 1836.

[TOLMIEA T. & G. Fl. N. A. 1: 582. 1840. Not Hook. 1834.]

1. **Leptaxis Menziesii** (Pursh) Raf. Fl. Tell. 2: 76. 1836.
Tiarella Menziesii Pursh, Fl. Am. Sept. 1: 313. 1814.
Heuchera Menziesii Hook. Fl. Bor. Am. 1: 237. *pl. 80.* 1833.
Tolmiea Menziesii T. & G. Fl. N. A. 1: 582. 1840.
British Columbia to Oregon.

14. TELLIMA R. Br. App. Frank. Journ. 765. 1823.

Stamens 10; stems 1½°–2° tall.	1. *T. grandiflora.*
Stamens 5; stems 6′–8′ tall.	2. *T. racemosa.*

1. **Tellima grandiflora** (Pursh) Dougl. Bot. Reg. *pl. 1178.* 1828.

Mitella grandiflora Pursh, Fl. Am. Sept. 1: 314. 1814.

Tiarella alternifolia Fisch.; Seringe, DC. Prodr. 4: 50. 1830.

Alaska to California.

Mr. Thos. Howell sends us from the Columbia River, near the Cascades, as *T. odorata*, a plant which we do not find sufficiently distinct from *T. grandiflora*, to maintain as a species.

2. **Tellima racemosa** (S. Wats.) Greene, Erythea, 3: 55. 1895.

Heuchera racemosa S. Wats. Proc. Am. Acad. 20: 365. 1885.

Washington.

In Erythea, 3: 55, Prof. E. L. Greene gives the reasons why, in his judgment, *Heuchera racemosa* S. Watson should be referred to *Tellima*, and in the same volume at page 102, after giving new reasons why he would restore to generic rank the genus *Lithophragma*, refers *Heuchera Williamsii* Eaton, to this latter genus. There certainly seems to be ground for both these positions. With reference to the plant collected by Mr. Williams it is interesting to note that both Mr. Canby and Prof. Eaton referred it to *Tellima* at first, and the latter put the plant finally into *Heuchera* simply because it had entire petals and five stamens. In the Flora of North America, Torrey and Gray, 1: 585, we are told that Mr. Nuttall, in his manuscript notes, called attention to the accordance of *Tellima Cymbalaria* Walp. (*Saxifraga Californica* Nutt. mss.) with *Lithophragma*, while he also noticed the fact that the styles are sometimes two only. This makes it easier for us to refer *Heuchera Williamsii* to *Lithophragma*.

If through the adoption of the arrangement above referred to, we sacrifice a stamen character, we gain by removing from the genus *Heuchera* the only two species that seem to be out of sympathy with the rest through having a purely racemose inflorescence.

15. LITHOPHRAGMA Nutt. Journ. Acad. Phila. 7: 26. 1834.*

Petals deeply palmately 3–7-parted.	
Raceme 3-6-flowered.	1. *L. tenella.*
Raceme 12–20-flowered.	2. *L. rupicola.*
Petals variously cleft or lobed.	
Calyx-tube obconic.	3. *L. parviflora.*
Calyx turbinate.	4. *L. affinis.*
Calyx campanulate.	
Pedicels very short.	5. *L. heterophylla.*
Pedicels about as long as the calyx.	6. *L. tripartita.*
Petals entire, undulate, or minutely toothed.	
Calyx campanulate, with a broad base.	
Pedicels very short.	7. *L. Bolanderi.*
Pedicels about as long as the calyx.	8. *L. scabrella.*
Calyx campanulate, narrowed at the base; stamens 10.	9. *L. Cymbalaria.*
Calyx obconic; stamens 5.	10. *L. Williamsii.*

1. **Lithophragma tenella** T. & G. Fl. N. A. 1: 584. 1840.
Lithophragma glabra T. & G. Fl. N. A. 1: 584. 1840.
Tellima tenella and *T. glabra* Walp. Rep. 2: 371. 1843.
Lithophragma parviflora A. Gray, Ives Rep. 15. 1860. Name only.
Vancouver Island to Utah.

2. **Lithophragma rupicola** Greene, Erythea, 3: 102. 1895.
California.

3. **Lithophragma parviflora** Nutt.; T. & G. Fl. N. A. 1: 584. 1840.
Tellima parviflora Hook. Fl. Bor. Am. 1: 239. 1833.
Pleurendotria parviflora and *P. reniformis* Raf. Fl. Tell. 2: 73. 1836.
Mitella parviflora Dietr. Syn. 2: 1539. 1840.
Vancouver Island, Oregon, Utah, Wyoming.

4. **Lithophragma affinis** A. Gray; Proc. Am. Acad. 6: 534. 1865.
Lithophragma heterophylla Torr. Pac. R. R. Rep. 4: 90. 1857.
Tellima affinis Boland. Catal. 11. 1870.
California.

5. **Lithophragma heterophylla** T. & G. Fl. N. A. 1: 584. 1840.
Tellima heterophylla Hook. & Arn. Bot. Beech. 346. 1840.
California.

---

* Original spelling, *Lithofragma.*

6. **Lithophragma tripartita** Greene, Erythea, **3**: 102. 1895.
Tellima tripartita Greene, Erythea, **1**: 106. 1893.
California.

7. **Lithophragma Bolanderi** A. Gray; Proc. Am. Acad. **6**: 535. 1865.
Tellima Bolanderi Boland. Catal. 11. 1870.
California.

8. **Lithophragma scabrella** Greene, Erythea, **3**: 102. 1895.
Tellima scabrella Greene; Pittonia, **2**: 162. 1891.
California.

9. **Lithophragma Cymbalaria** T. & G. Fl. N. A. **1**: 585. 1840.
Tellima Cymbalaria Walp. Rep. **2**: 372. 1843.
California.

10. **Lithophragma Williamsii** (D. C. Eaton) Greene, Erythea, **3**: 102. 1895.
Heuchera Williamsii D. C. Eaton, Bot. Gaz. **15**: 62. 1890.
Tellima nudicaulis Greene, Pittonia, **2**: 162. 1891.
Montana, Wyoming.

16. MITELLA L.

Stem leafy.
  Stem-leaves a single pair, opposite; stamens 10. 1. *M. diphylla.*
  Stem-leaves 2–3, alternate; stamens 5. 2. *M. caulescens.*
Stem a leafless scape.
  Stamens 10. 3. *M. nuda.*
  Stamens 5.
    Stamens opposite the petals. 4. *M. pentandra.*
    Stamens alternate with the petals.
      Petals greenish or yellow, pinnately-parted.
        Leaves round-reniform, mostly glabrous. 5. *M. Breweri.*
        Leaves oval, hirsute on upper surface. 6. *M. ovalis.*
      Petals white, 3-cleft.
        Calyx campanulate, lobes long, spreading. 7. *M. trifida.*
        Calyx-lobes short; leaves angulate-lobed. 8. *M. diversifolia.*

1. **Mitella diphylla** L. Sp. Pl. 406. 1753.
Quebec to Minnesota, North Carolina and Missouri.

2. **Mitella caulescens** Nutt.; T. & G. Fl. N. A. **1**: 586. 1840.
Washington, Oregon, Idaho.

3. **Mitella nuda** L. Sp. Pl. 406. 1753.
Newfoundland to British Columbia, Pennsylvania and Michigan.

4. **Mitella pentandra** Hook. Bot. Mag. *pl. 2933*. 1828.
Drummondia mitelloides DC. Prodr. 4: 50. 1830.
Pectiantia mitelloides Raf. Fl. Tell. 2: 72. 1836.
Mitellopsis Drummondia Meisner, Pl. Vasc. Gen. 1: 100. 1836.
Mitellopsis pentandra Walp. Rep. 2: 370. 1843.
Alaska, British Columbia, Montana, Colorado, Utah.

5. **Mitella Breweri** A. Gray, Proc. Am. Acad. 6: 533. 1865.
British Columbia, Washington, California.

6. **Mitella ovalis** Greene, Pittonia, 1: 32. 1887.
Mitella Hallii Howell, Erythea, 3: 33. 1895.
Vancouver Island.

7. **Mitella trifida** Graham, Edinb. New Phil. Journ. April, 1829. 185.
Ozomelis varians Raf. Fl. Tell. 2: 73. 1836.
Mitellopsis Hookeri Meisner, Pl. Vasc. Gen. 1: 100. 1836.

8. **Mitella diversifolia** Greene, Pittonia, 1: 32. 1887.
California, Oregon.

17. LEPUROPETALON Ell. Bot. S. C. & Ga. 1: 370. 1817.

1. **Lepuropetalon spathulatum** (Muhl.) Ell. Bot. S.C. & Ga. 1: 370. 1817.
Pyxidanthera spathulata Muhl. Cat. 24. 1813.
Cryptopetalum pusillum Hook. & Arn. Bot. Misc. 3: 345. 1832.
Lepuropetalon pusillum C. Gay, Fl. Chil. 3; 42. 1847.
South Carolina, Chile.

18. CHRYSOSPLENIUM L.

Leaves alternate; stamens 8.	1. *C. alternifolium.*
Leaves opposite, or alternate; stamens 4.	2. *C. tetrandrum.*
Leaves opposite; stamens 8.	
Leaves obscurely crenate-lobed.	3. *C. Americanum.*
Leaves crenate-dentate.	4. *C. glechomaefolium.*

1. **Chrysosplenium alternifolium** L. Sp. Pl. 398. 1753.
Alaska, Europe, Asia.

2. **Chrysosplenium tetrandrum** Th. Fries, Bot. Notis. 193. 1858.
Chrysosplenium alternifolium var. *tetrandrum* Lund. in Sched. ex Maxim, Mel. biol. 9: 761.

British Columbia. Recorded by Franchet (Nouv. Arch. Mus. Paris (III.) 2: 107 from Alaska and the mountains of Colorado (Harbour 576).

3. **Chrysosplenium Americanum** Schweinitz; Hook. Fl. Bor. Am. 1: 242. 1833.

New Jersey, Pennsylvania, New York, Wisconsin.

4. **Chrysosplenium glechomaefolium** Nutt.; T. & G. Fl. N. A. 1: 589. 1840.

Chrysosplenium oppositifolium var. β Hook. Fl. Bor. Am. 1: 242. 1833.

Columbia, Washington.

19. PARNASSIA L.

Petals fimbriate toward the base. 1. *P. fimbriata.*
Petals not fimbriate.
Sterile filaments 3 in each set; flowers large, 1 inch in diameter or more.
Leaves ovate or cordate ovate.
Sterile filaments longer than the stamens. 2. *P. grandifolia.*
Sterile filaments about equalling the stamens. 3. *P. Caroliniana.*
Leaves reniform. 4. *P. asarifolia.*
Sterile filaments 3–8 in set; flowers small, less than 1 inch in diameter.
Low, 8 inches or less; scape leafless, or with a small leaf near the base. 5. *P. Kotzebuei.*
Taller, the leaf not much below the middle of the scape. 6. *P. parviflora.*
Sterile filaments about 10 (9–15) in each set. 7. *P. palustris.*
Sterile filaments about 20 in each set. 8. *P. Californica.*

1. **Parnassia fimbriata** Banks; Sims & Koen. Ann. Bot. 1: 391. 1805.

Alaska, Washington, California, Montana, Wyoming, Colorado, Nevada, Utah.

2. **Parnassia grandifolia** DC. Prodr. 1: 320. 1824.

North Carolina, southwestern Virginia, Missouri, Florida.

3. **Parnassia Caroliniana** Michx. Fl. Bor. Am. 1: 184. 1803.

New Brunswick to Manitoba, Virginia, Illinois and Iowa.

4. **Parnassia asarifolia** Vent. Jard. Malm. *pl. 39.* 1803.

North Carolinia, Georgia, Virginia.

5. **Parnassia Kotzebuei** Cham. & Schlecht. Linnaea, 1: 549. 1826.
Labrador, Bering Strait, Rocky Mountains.

6. **Parnassia parviflora** DC. Prodr. 1: 320. 1824.
Canada, Utah.

7. **Parnassia palustris** L. Sp. Pl. 273. 1753.
Labrador, Minnesota, Canada, Northwest Territory, Lake Superior.

8. **Parnassia Californica** (A. Gray) Greene, Pittonia, 2: 102. 1890.
Parnassia palustris var. *Californica* A. Gray, Bot. Calif. 1: 202. 1876.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE No.—88.

A Neglected Carex.

BY EUGENE P. BICKNELL.

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 23, No. 3, Mar., 1896.]

A neglected Carex.

BY EUGENE P. BICKNELL.

In his "Analytical Table" (1824) Schweinitz published the name *Carex typhinoides*. No description of the plant appears beyond that which is afforded by five formal propositions of the "Table" which lead up to the name. The outline thus presented proves to be too lightly sketched to fix with certainty the identity of the plant intended, nor is there to be found in the "Monograph" of Schweinitz and Torrey, subsequent to the "Table" by only two years, any hint as to what the plant may have been. Later caricologists have referred the name to *Carex squarrosa* as a synonym.

The absence of any allusion to the name in Schweinitz and Torrey's "Monograph" would now be hard to explain were there not still in existence a letter written by Schweinitz to Torrey bearing on precisely this point. This letter is now on file at the Columbia College Herbarium and bears date "Bethl[ehem, Pa.], July 6 1824." I quote as follows: "I have very carefully revised the Carices this season, but have no other corrections to make of consequence, except requesting you by all means to strike out the whole of the description of my proposed new species *Carex typhinoides*, for I have found it in great plenty this year, growing in such a manner as to leave no doubt that it is only a variety of *C. squarrosa*."

This statement, however, although enlightening as regards the "Monograph," is less conclusive than it might appear respecting the status of *Carex typhinoides*. The plant may indeed have been a several-spiked form of *Carex squarrosa*, long supposed to be a monostachyous species, as the "Table" has it, and known as *Carex typhina* Michx., or it may have been another plant, a species nearly allied to *Carex squarrosa*, which it is the purpose of this paper to define. Indeed Dewey interpreted the Schweinitzian plant in terms of this very species which he described as *Carex squarrosa* var. *typhinoides* (11: 316, 1826). But, while Dewey's description leaves no doubt as to the plant he had in view, it may fairly be doubted whether Schweinitz's name was correctly taken up for it. Should such a doubt be insisted on, another name would have to be added to the already overcrowded lists of *Carex*. It would therefore seem to be a reasonable, if technically vulnerable course to accept the interpretation of Dewey, a contemporary of Schweinitz, and base on it the identity of the plant which Schweinitz inadequately described and subsequently abandoned.

In now delimiting *Carex squarrosa* from *Carex typhinoides* it becomes necessary to redescribe in detail the former plant in connection with the description of its near ally with which it has all along been confounded.

CAREX SQUARROSA L.

About two feet high, culm slender, smooth below, rough on the angles above. Leaves and bracts long and narrowly accuminate, 2″ wide (1″–3″), pale green, rough on the edges. Spikes usually 1 or 2, sometimes 3, becoming tawny-stramineous, globose to oblong-cylindric, rounded at the top, rarely over 1′ long, the terminal one 6″–14″ long, 8″–9″ wide, the lower ones much smaller and often sub-globose, on short, slender, ascending peduncles; staminate portion of terminal spike conspicuous, clavate, rarely less than ½ the length of the fertile upper portion, sometimes ¾ its length, the loosely imbricated scales very acute or acuminate. Perigynia numerous, much crowded, reflexed at the base of the spike, above spreading or slightly ascending, 4″–4½″

long, somewhat inflated, obovoid-oblong or narrower, few-nerved, tapering more or less abruptly into the long and slender, straight, mostly smooth two-toothed beak. Achene stipitate, linear-oblong, trigonous with blunt angles and flat sides, minutely granular-puncticulate, often faintly striate, tapering into the continuous, persistent, brown style, which is stout at the base, turgid, and sinuously bent.

Specimens examined show a range of this species from Connecticut and New York to North Carolina, Tennessee, Indiana and Texas. The few records of *Carex squarossa* from Massachusetts appear to refer to the typical plant.

CAREX TYPHINOIDES Schw.

About two feet high or rather less, darker green than *C. squarrosa*, the culm usually stouter and more sharply angled, the lower leaves often more approximate and with shorter sheaths. Culm smooth below, rough on the angles at the top, leaves and bracts broad, 2″–5″ wide, rough on the edges, the leafy bracts much exceeding the culm, spikes becoming dull stramineous, 2–6, mostly 3, contiguous or separated, when more than 3 the longer ones often distant, all but the terminal one (or upper two) on slender, erect or ascending peduncles, which are sometimes 2′–3′ long; all the spikes are longer and narrower than in *C. squarrosa*, the terminal one 12″–20″ long, 6″–7″ wide, conoid-cylindric, usually truncate at base and slightly tapering above the middle to the conical apex which is usually pointed with a more or less evident tuft of sterile scales. Basal staminate portion of spikes very short or obscure, even in the terminal spike rarely over 3″ long, the scales oblong or oblong-lanceolate, mostly obtuse, the upper ones curiously reflexed in a rosette against the lower perigynia. Perigynia densely compressed-crowded, the beaks sharply ascending except those near the base of the spike, of rather thicker texture than those of *C. squarrosa* and shorter, 3″–3½″ long, cuneate-obovate, truncate or abruptly contracted to the slender but strong, roughish, minutely two-toothed beak, which is strongly nerved at the base, and often slightly incurved as well as upwardly bent. Scales mostly equalling the body of the perigynium, oblong-lanceolate, obtuse. Achene ovate-elliptic, trigonous with concave sides, the angles slightly swollen in the middle, very minutely granular-puncticulate, not striate, not tapering into the style which is very slender, straight, greenish, easily detaching at the base or a little above.

Quebec to Washington, D. C., Missouri and Louisiana.

About New York I find *C. squarrosa* in damp or wet places in woods and meadows; *C. typhinoides* occurs more particularly in overflowed meadows and along river bottoms. In such places the two plants often grow together, but in woods or wet places on higher ground, where *C. squarrosa* often grows in abundance, *C. typhinoides* seems never to occur.

Extreme forms of these two sedges are strikingly unlike in appearance; other forms show a similarity of aspect which is sometimes confusing. However the identity of such forms comes out plainly enough upon closer observation, and can always be instantly established by an appeal to fruit characters. The differences in the achenes and styles of the two plants is especially noteworthy and have proved to be singularly constant in a large number of specimens from widely separated localities.

It may be added that *Carex squarrosa* as described by Linnaeus is clearly that species as distinguished from *Carex typhinoides;* so also is the *Carex typhina* of Michaux. The species was first figured by Schweinitz and Torrey (Monograph, plate 27); later it was figured by Dewey (11: *pl. 2. fig. 29.* 1826). Boott's illustrations of *Carex squarrosa* (1860) refer in part only to that species as here defined. His plate 281 is unmistakably *Carex typhinoides,* while plate 280 can scarcely be other than a composite figure made up partly of each species.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE No.—89.

NOTES ON SOME FLORIDA PLANTS.—II.

BY GEO. V. NASH.

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 23, No. 3, Mar., 1896.]

Notes on some Florida Plants.—II.

By Geo. V. Nash.

My second collection of Florida plants was made in 1895, beginning late in May and ending early in September. Very little collecting, except among the Fungi and Lichens, was done in Eustis or its vicinity, the field of my operations the previous year, although I again made this place my headquarters. The area explored extended from the Manatee River in the south to Jacksonville in the north, thence westward through Columbia, Jefferson, Leon and Gadsden Counties, to the Apalachicola River. This was my main collecting ground, and is all tributary to the Florida Central and Peninsular Railroad. The country traversed by this road is very interesting, particularly from a botanical standpoint, the flora varying from semi-tropical to temperate. The terminus of the southern division is at Tampa, where the vegetation is semi-tropical. The country to the north of this is an alternation of high pine land, called locally "black jack ridges," and flatwoods, yielding a most interesting lot of plants. The western division extends from Baldwin to River Junction in Gadsden county. The flora of this section is quite different from that of the peninsula, and more nearly approaches that of the North. This is particularly the case at Tallahassee and in its immediate vicinity. The soil is a red clay, and the country one of hills and valleys, a most unusual condition for this State. Familiar plants of the North were continually turning up. This red clay country is only a few miles in extent, however, and soon disappears, the pine lands again becoming prominent.

As stated above, my main collecting field was from the Manatee river to the Apalachicola river. In addition to this I made two or three trips to Sanford, in Orange Co.; one to Titusville, on the Indian River, in Brevard Co., my only approach to the east coast; and a short trip from Tallahassee to St. Marks, in Wakulla Co., where Rugel collected in 1843 and discovered some interesting things, some of which I succeeded in again finding.

The Mantatee river is nearly tropical in its flora. On Sneed's Island, at the mouth of this river, are found a number of strictly tropical plants, which cannot be secured on the mainland for a number of miles further south. Their occurrence on this island is probably due to the immunity it enjoys from frost, the water serving as a protection.

The above brief account will give some idea of the varied nature of my collections in 1895. A large number of species and varieties new to science, some plants hitherto unknown to occur in the State, and a number of rare things were secured. The following notes on the more important acquisitions may be of interest:

Tumion taxifolium (Arn.) Greene. (*Torreya taxifolia* Arn.) The only known locality, the Apalachicola river, for this rare conifer was visited in August and September. The natives, by whom it is called " stinking cedar," informed me that it occurred from just south of the Georgia line to a distance of some fifteen miles down the river, and that it was confined exclusively to the eastern bank. The locality where I saw it growing was about one quarter of a mile north of River Junction. In this spot there were some twenty or thirty trees. The tree is conical in outline, the branches horizontal and widely spreading. The foliage is a fine deep green, the upper surface shining. The odor of the bruised leaves is very disagreeable, as I discovered on climbing one of the trees, and the local name of "stinking cedar" is well applied. The leaves are also quite sharp-pointed and irritate the skin considerably, causing an unpleasant burning sensation. On my first visit in August I succeeded in finding only one tree in fruit. On my next visit, on September 5, I discovered further up two or three more fruiting specimens.

The tree is evidently having a hard struggle to maintain itself. In the locality visited by me it occupies the very extremities and sides of the small ridges extending from the high pine land out into the river swamp. I could find none in the low-lying ground at the base of the ridges nor in the high pine land further back. Its evident inability to thrive in the very low land and the antagonism of the other surrounding trees which are better suited to the environment make its final extinction apparently certain. No. 2381.

Paspalum arenarium Schrad. In the low pine land around Eustis, Lake Co. Not very common. No. 2074.

Paspalum racemosum Nutt. Rare. Found in the pine land at River Junction, Gadsden Co. In the living state the plant has a decidedly glaucous hue. No. 2579.

Cenchrus gracillimus Nash. Further observation of this grass in the field confirms the disposition I made of it last year. It is very distinct from *C. tribuloides.* This grass is very common around Eustis, Lake Co., but its occurrence in the northern and western parts of the State was not noticed. No. 1766.

Cenchrus incertus M. A. Curtis. Quite common in the pine land at River Junction, Gadsden Co., but not seen east of that place, nor in the peninsula. It is very distinct. The broader spines, and the entire absence of reflexed spines at the base of the involucre, giving it a naked appearance, well distinguish it from any form of *C. tribuloides.* No. 2580.

HYDROCHLOA FLUITANS (Michx.) (*Hydrochloa Carolinensis* Beauv.). At Lloyds, Jefferson Co., flowering profusely, in which condition it is very rare. In a sterile state it is very common in many bodies of still water. No. 2512.

ARISTIDA PATULA Chapm. ined. (*Aristida scabra* Chapm. Fl. S. St. 663. 1884. Not Kunth, 1833.) In the pine land back of Titusville, Brevard Co., No. 2295; near Sanford, Orange Co., No. 2276; and very common just back of the beach line at Ballast Point, near Tampa, where it grew luxuriantly, forming large tufts, No. 2424a.

ERAGROSTIS HIRSUTA (Michx.) Not Nees, 1829, nor Wood, 1861. (*Poa hirsuta* Michx.) Very common in fields at Tallahassee, Leon Co., forming broad tufts, 2–3 feet tall. No. 2521. The synonymy of this grass is exceedingly mixed. The *E. hirsuta* Nees (Fl. Bras. 2: Part 2, 508. 1829), *E. hirsuta* Wood (Classbook, 796. 1861), and *Poa hirsuta* Muhl. (Gram. 145. 1817), appear to be the *E. pectinacea* A. Gray, judging from the descriptions given in each case. The *Poa hirsuta* Michx. is apparently an entirely different plant, as evidenced by a fragment of the type of Michaux, preserved in the Columbia College Herbarium. This grass ranges from North Carolina to Florida, thence west to Louisiana, and possibly to Texas. It has been confounded with *E. capilliaris* Nees. Curtiss' No. 3499 belongs here.

Uniola longifolia Scribn. Found growing abundantly along the edge of a dry woods, near Tallahassee, No 2521; also in pine woods at River Junction, Gadsden Co., about forty miles to the west of the above place, No. 2591a. I was much surprised at its further occurrence in some abundance in a tropical hammock on Sneed's Island, near the mouth of the Manatee River, in the southern part of the peninsula, over 400 miles from the above named localities. The villous sheaths of this species are constant, and readily separate it from the others of the genus.

Rynchospora miliacea (Lam.) A. Gray. Apparently rare, as I found it in only two places, both within a few miles of Eustis, Lake Co., No. 1845.

Scleria hirtella Sw. Rare. Among tall grass in the low pine land, near Eustis, Lake Co., No. 1917.

SABAL ETONIA Swingle, n. sp.

Plant 8–14 dm. tall. Rootstock more or less contorted, elongated, bearing numerous roots on the lower surface along its entire length; leaves nearly orbicular in outline, 4–6 dm. long, about two-thirds the length of the petioles, strongly folded at the base along the middle, divided almost to the bottom, the divisions linear, acuminate, the sinuses long-filiferous; petioles 1–1.5 cm. broad, smooth, triangular, the back rounded, the edges sharp; spadix a little shorter than the leaves, branching above, erect or ascending in flower, prostrate in fruit; flowers yellowish white; divisions of the perianth elliptic, obtuse, 5-nerved, 3–3.5 mm. long, 1. 5–1.75 mm. broad, concave; stamens a little longer than the perianth, the filaments broad-subulate, slightly exceeding 3 mm. in length; anthers narrowly ovate, about 1.5 mm. long; fruit 1.3–1.5 cm. in diameter.

Very common in and confined strictly to the "scrub." Collected in 1894 in the vicinity of Eustis, Lake Co., and distributed under No. 999.

Mr. W. T. Swingle, of the Sub-Tropical Laboratory at Eustis, first called attention to this new palm at the meeting of the Botanical Club, A. A. A. S., in Madison Wis., in August, 1893,* but no description of it has hitherto been published, so far as I am able to ascertain.

It is related to *S. Palmetto*, but it is abundantly distinct from that species, particularly in its manner of growth. The rootstocks of the two species are totally unlike. In the seedling state they are probably very similar, judging from examinations made on comparatively young plants of both forms. As they grow older, however, the differences in manner of growth become very marked. In *S. Etonia* the rootstock is elongated and more or less contorted, in some instances doubling and redoubling on itself, forming a perfect S. It is firmly anchored in the soil by innumerable roots, borne along its under surface, the growing end running along the surface of the soil, but never rising above it. As stated above, the rootstock is always elongated, from 2–3 feet in length, the rear part apparently dying and rotting away as the bud advances.

In *S. Palmetto* the behavior of the rootstock is very different, and only in very young plants can its early stages be found. It goes directly down, then bends sharply and rises to the surface, continuing in an erect aërial stem which often attains a height of 50–70 feet. In the young plants this downward portion is manifest as an erect spur-like body, appressed to and much smaller than the ascending part of the rootstock, but it soon disappears and in plants but a few feet in height no trace of it can be found. In old individuals, therefore, the subterranean extremity of the trunk is knob-like, with hundreds of roots radiating in all directions, making a marked contrast to the elongated and contorted rootstock of *S. Etonia*, bearing roots its entire length. The fruit in *S. Etonia* is larger than that in *S. Palmetto*.

---

*Bull. Torr. Bot Club, 20:364. 1893. Bot. Gaz. 18:348. 1893.

Lachnocaulon Beyrichianum Sporleder. Very abundant around the shores of Blue Lake and Lake Gracie, both near Eustis, Lake Co. No. 1855.

Lachnocaulon glabrum Koern. Not as common as the above. Along the sandy shore of Blue Lake, near Eustis. No. 1981.

HABENARIA CONSPICUA n. sp.

Whole plant glabrous, 4–8 dm. tall. Leaves linear to lanceolate-linear, erect or ascending, usually acute, the lower one 10–25 cm. long, 1–2 cm. broad, the remaining ones gradually becoming shorter and passing into the bracts of the inflorescence; spike ovate to oblong, 6–12 cm. long, 5–7 cm. in diameter; flowers numerous, white; tube of the calyx 2–2.5 cm. long, the sepals orbicular or nearly so, 7 mm. in diameter; petals oblanceolate, about 5 mm. long, from nearly entire to more or less toothed at the apex; lip 12–15 mm. in length, narrowly oblong, the claw 4–5 mm. long, the blade deeply fimbriate; spur curved, narrowly cylindric, 4–5 cm. in length.

Collected on the edge of a sphagnum bog at Lake City, Columbia Co., No. 2501, and observed at a number of other places. It was distributed in my collection of 1894, under No. 1700, as *H. blephariglottis*, from which it is abundantly distinct, the larger flowers, longer spur, and deeply fimbriate lip readily separating it.

Tipularia unifolia (Muhl.) B. S. P. In great abundance and in fine condition on a damp hillside near Tallahassee, Leon Co. No. 2361.

Persea humilis Nash. Further observation in the field confirms me in the disposition made of this tree last year. It is confined exclusively to the "scrub," a sandy area covered with scrub oaks, intermixed with the scrub pine, *P. clausa*, and the home of *Sabal Etonia*. When in the virgin "scrub," it rarely attains a height of more than 6 or 8 feet. In the open, or along the roadside, where the surrounding shrubs have been cut away, it often becomes 15 or 20 feet tall. Mr. H. J. Webber, of the Sub-Tropical Laboratory at Eustis, kindly collected for me last November a lot of fine fruiting specimens, thus enabling me to distribute it in fruit, No. 2601.

WAREA SESSILIFOLIA n. sp.

Annual. Whole plant glabrous, branched, sometimes diffusely so, 3–6 dm. tall; leaves erect or ascending, ovate, sessile, those on the stem 1–2 cm. long, 5–10 mm. broad, those on the branches gradually reduced, the uppermost one usually about 5 mm. long; racemes densely flowered, 2–3 cm. in length; pedicels filiform, 6–10 mm. long; sepals spatulate, purple at the broadened base, becoming greenish towards the apex, 7–8 mm. long, about 1 mm. broad, reflexed; petals deep purple, the claw 5–6 mm. long, filiform above, gradually broadened toward the base, pubescent on the lower half, the blade broadly ovate or oval, abruptly narrowed into the claw, about 5 mm. long, 4–4.5 mm. broad; stamens about 1.5 cm. in length, the filaments thread-like, purple except toward the white summit; anthers linear, coiled when dry, 2 mm. long, .5 mm. broad; pod not seen.

Collected in the pine lands at Bellair, about 4 miles south of Tallahassee, Leon Co. The larger deep purple flowers and the ovate merely sessile leaves, not sagittate nor clasping as in *W. amplexifolia*, readily distinguish this plant from either of the other species. No. 2544.

GLOTTIDIUM FLORIDANUM ATRO-RUBRUM n. var.

Flowers a deep black-purple. Otherwise much as in the type.

Occurring from Tampa, where my specimens were secured, southward, No. 2415. In this region it entirely replaces the yellow-flowered form which is very common from Lake Co. north to Jacksonville and west to Tallahassee.

Melia Azederach L. Escaping into the low woods around Eustis, Lake Co.; also at Tallahassee, Leon Co., where my specimens were obtained. No. 2359.

Crotonopsis spinosa Nash. Found in great abundance about three miles north of Eustis, Lake Co., No. 1971. Very common from Lake City, Columbia Co., westward.

CYRILLA PARVIFOLIA Shuttlw. n. sp.

A compact and much branched shrub about two metres tall.

Glabrous; leaves cuneate-obovate or oblanceolate, short-petioled, reticulate, acute, or the smaller ones obtusish, 1.5–5 cm. long, 5–12 mm. wide; racemes 3–8 cm. in length; flowers numerous, sepals triangular, 1 mm. long, slightly longer than broad, petals narrowly elliptic-ovate, rugose-thickened at the base and along the middle for about two-thirds their length, obtuse, 2.5 mm. long, 1 mm. broad; stamens 2.5 mm. long, filaments linear-subulate, anthers oval, .6 mm. long; capsule nearly globuse, slightly flattened laterally, 2.5–3 mm. in diameter.

Collected in fruit at St. Marks, Wakulla Co., No. 2543. Since distributing my plants I find that the name parvifolia was applied, but not published, by Shuttleworth to specimens of the same thing collected in flower by Rugel, in 1843, also at St. Marks. I therefore publish it as above.

It is quite distinct from *C. racemiflora*, the lower habit, smaller leaves, shorter racemes, and globose, not ovoid, capsules readily serving to separate it from that species.

Acer Drummondii Hook. & Arn. Very common in swamps, No. 2147. My No. 872, of the 1894 collection, is also this species, and not *Acer rubrum* L., under which name it was distributed.

Sapindus Manatensis Radlkofer. I secured good fruiting specimens of this tree, No. 2460. The type locality is the mouth of the Manatee River. My collection was made on the south side of Sneed's Island, not far from the mouth of this river. Mr. J. H. Simpson, of Manatee, a gentleman very familiar with the flora of that region, informs me that the tree is confined to the above named island, and thrives only there; that there are a few trees on the mainland, but that they are stunted and not at home.

From the above it would seem that my specimens were from the type locality, as it is not known to occur anywhere else near the mouth of the Manatee River. It is certainly distinct from *S. marginatus*, not only in the shape and size of the glabrous leaves, but also in the larger and oblong fruit. In *S. marginatus* the fruit is globose, and the leaves pubescent.

SIDA RUBRO-MARGINATA n. sp.

Much branched, 6–10 dm. tall. Stems purple, sparingly pubescent or glabrous; stipules linear, 5–10 mm. long; leaves bright light green, glabrous, lanceolate, narrow-elliptic, or obovate, serrate, purple-margined, acutish at the apex, narrowed and rounded at the base, 1.5–5.5 cm. long, 3–20 mm. wide, on slender petioles 3–5 mm. long; peduncles single, shorter than the leaves, 7–15 mm. long; flowers light orange, 3–3.5 cm. in diameter; calyx angled, its teeth deltoid, acute or acuminate, about 5 mm. long; petals obovate-deltoid, about 1.5 cm. long, unequally 2-lobed at the apex, the margins, except toward the base, ciliate with short glandular hairs; carpels 8-10, usually 2-awned.

Collected at Ballast Point, near Tampa, No. 2472. Also secured by Dr. Palmer in 1874, at Fort Capron, on the Indian River, No. 54.

Abundantly distinct from *S. rhombifolia* L. by its taller habit, bright light green thicker leaves, shorter peduncles, and larger deeper colored flowers. *S. rhombifolia*, moreover, is apparently introduced into Florida, as it occurs only in waste places, while this plant is evidently indigenous to the state.

CORNUS MICROCARPA n. sp.

Shrub 3–4 metres tall, stems slender and recurved, branching toward the top. Bark gray; branches brownish, sparingly pubescent; leaves 3–9 cm. long, 1.5–4.5 cm. broad, oval, acute at the base, abruptly blunt-pointed at the apex, appressed-pubescent on both sides, sparingly so on the upper surface, the hairs on the lower surface curled; petioles 2–6 mm. long, more or less pubescent; cymes pubescent; flowers white, 6 mm. in diameter; calyx-teeth deltoid, about .5 mm. long; petals ovate, about 2.5 mm. long, 1–1.3 mm. broad, appressed-pubescent on the outside; filaments subulate, 2.5 mm. long; anthers 1.5 mm. long; fruit light blue, about 4 mm. in diameter, the stone slightly compressed, longer than broad, 2.5–3 mm. long, 2–2.5 mm. broad.

Collected in fruit in low woods at River Junction, Gadsden Co., No. 2589. Specimens of the same in flower, collected by Dr. Chapman, are in the Herbarium of Columbia College, and also in the National Herbarium.

Nearest to *C. asperifolia*, but easily distinguished by its smaller flowers and fruit, the latter light blue and with a stone longer than broad.

Dr. Chapman, in his Flora of the Southern United States, p. 168, describes the fruit of the *C. asperifolia* of that work as "pale blue." In Coulter & Evan's monograph of the genus Cornus, the fruit of *C. asperifolia* is given as white. I do not remember having seen a white-fruited Cornus in the state. It is probable that all of the Florida material, hitherto referred to *C. asperifolia*, belongs here.

Bumelia lanuginosa Pers. Quite frequent around Lake City, Columbia Co., No. 2167. The plant I distributed in my 1894 collection, under the above name, No. 818, is probably *B. tenax.*

Jacquemontia tamnifolia (L.) Griseb. Quite common in a field at Tallahassee, Leon Co., No. 2516. I do not find that it has before been recorded from Florida.

Nama corymbosa (Ell.) Kuntze. (*Hydrolea corymbosa* Ell.) In 1894 I secured a few specimens of this rare plant. Last summer I found it growing in great abundance in the flatwoods along the Jacksonville, Tampa & Key West R. R., between Paola and Sanford. No. 2281.

VERBENA (§NOBILES) TAMPENSIS n. sp.

Glabrous, or pubescent with short appressed hairs. Stems erect from a decumbent and often creeping base, usually more or less branched; leaves oval or ovate, paler beneath, 2.5–7 cm. long; acute, cuneate and entire at the base, narrowed into margined petioles .5–2.5 cm. long, coarsely and irregularly crenate-serrate; spikes 2–10 cm. in length, capitate when young, cylindric in age and often interrupted below, its bracts subulate, strigillose, ciliate, about one-half as long as the calyx; calyx strigillose, 12–15 mm. in length, its teeth subulate, 2–4 mm. long; corolla purple, the tube pubescent on the outside and in the throat, about 1.5 cm. long, the limb 1 cm. in diameter, its lobes obovate, emarginate at the apex; anthers without a gland on the connective; nutlets cylindric with a broadened base, about 4 mm. long, furrowed a the base and areolate toward the apex.

Collected just back of the beach line at Ballast Point, near Tampa, No. 2470. Curtiss's No. 1963, distributed as *V. Aubletia* L., belongs here; also Garber's plant, collected at Tampa in May, 1876. In general appearance this plant has some resemblance to *V. Aubletia*, but a critical examination will readily show its differerences. The entire absence of the gland on the anther connective, a character of the section in which *V. Aubletia* is placed, at once makes manifest its dissimilarity to that species.

MONARDA PUNCTATA LEUCANTHA n. var.

Of much taller habit, 10–15 dm., the flowers pure white, spotted with purple; otherwise much like the type.

A few specimens of this were secured at Ballast Point, near

Tampa, No. 2420; but on Sneed's Island, near the mouth of the Manatee River, it occurred in great abundance and luxuriance, forming large masses, at the foot of a shell mound, No. 2456. In both localities the flowers were a pure white. *Monarda punctata* was observed in great abundance in the northern tier of counties from Lake City westward, being particularly common around Tallahassee and River Junction. The flowers were invariably of a dull golden yellow. From Tampa south this was entirely replaced by the white-flowered form.

SCOPARIA GRANDIFLORA n. sp.

Plant glabrous, or sparingly puberulent, 7–12 dm. tall, usually much branched, the branches erect or ascending, in whorls of three. Leaves in 3's, 2–5 cm. long, 3–10 mm. wide, oblanceolate, acute, entire and attenuate at the base into short margined petioles, remotely and irregularly serrate above the middle with obtuse teeth; pedicels single in the axils of the leaves, filiform, 4–8 mm. long, spreading or ascending; calyx 3 mm. long, its 4 lobes oval, obtuse or acutish, about 2.5 mm. long, 3-nerved, strongly glandular on the outside, ciliate; corolla white, 1 cm. broad, its 4 lobes oblong-obovate, 4 mm. long, 2.5 mm. broad; stamens 4, the filaments about 2.5 mm. long, the anthers oblong, 1.5 mm. long, .75 mm. broad; ovary oval, one-half as long as the style; capsule ovoid, about 2.5 mm. long, equalling or slightly shorter than the calyx and as long as or exceeded by the style; seeds .5 mm. long, oblong.

Collected in the flatwoods at Tampa, where it was quite frequent, No. 2417. Also secured by Mr. J. H. Simpson in 1889, and determined as *S. dulcis*, to which species it has but a superficial resemblance. What appears to be the same thing was found by Mr. H. J. Webber at Manatee.

This plant is readily distinguished from *S. dulcis* L. by its greater height; the larger corolla, twice the diameter of that of *S. dulcis*; the ciliate and less strongly nerved calyx lobes; the capsule not exceeding the sepals; the longer style; and the much larger seeds, nearly twice the size of those in *S. dulcis*.

UTRICULARIA FLORIDANA n. sp.

Stems rooting at the base, 6–15 dm. in length. Leaves capillary, much divided; scapes simple, or sometimes with a single branch, weak and tortuous, 15–40 cm. in length, 10–25-flowered, thick and spongy, much attenuated toward the base; pedicels erect or ascending, even in fruit, 1–1.5 cm. long, slender; flowers yellow, about 1.5 cm. in diameter; spur conic-cylindric, straight, obtuse, ascending, about 7 mm. long, shorter than the lower lip; capsule 5–8 mm., in diameter.

Very abundant in a small pond between Eustis and Umatilla, Lake Co., No. 1970. It formed a belt, a few feet from the shore, some 15 feet wide. This is apparently the same as my No. 492 of the 1894 collection, obtained in a sterile condition at Lake Irma, near Eustis. It grew nearer the shore and in shallower water than the plant I collected the past summer, so I was enabled to secure the lower portions of the plant. The stem crept along the mud at the bottom, sending up two kinds of branches, one bearing leaves and no bladders, the other the reverse of this. In this respect it is related to *U. oligosperma*, but in that species the stem is free-swimming; it also differs much in other particulars.

Plantago aristata Michx. This plant is just making its appearance around Eustis, Lake Co., in waste places and orange groves. None of it was observed in 1894, and but a few specimens this past summer. No. 1828.

EUPATORIUM ANOMALUM n. sp.

Whole plant, particularly the branches of the inflorescence, pubescent with short appressed rigid hairs. Stem 8–15 dm. tall; leaves spreading or ascending, 3–7 cm. long, 1–3 cm. broad, ovate to ovate-lanceolate, acute at both ends, short-petioled, coarsely and irregularly serrate, obscurely 3-nerved; involucre 5-flowered, resinous-dotted, cylindric, 5–6 mm. long, about 2 mm. in diameter, its 10-12 acute or acutish scales appressed-pubescent, scarious on the margins, the 5 inner ones linear or linear-lanceolate, much exceeded by the pappus, the outer scales much shorter than the inner; achenes resinous-dotted.

Collected at Lloyds, Jefferson Co., at the margin of a low woods, No. 2515. Apparently the same plant occurs at Fortress Monroe, Va., represented by a specimen in the National Herbarium, collected by Dr. Geo. Vasey.

Its affinity is with *E. hyssopifolium*, but readily separated from any form of that species by its much taller habit, and the broader and differently shaped leaves which are coarsely and irregularly serrate.

LACINARIA CHAPMANII LONGIFOLIA n. var.

Stems minutely pubescent, 6–15 dm. tall. Leaves narrowly linear, much attenuated at the base, glabrous, punctate, 1-nerved, the lower 10–15 cm. in length; inflorescence, involucre and flowers much as in the type.

In pine lands between Tampa and Ballast Point, about 5 miles from the former place, along the line of the electric railroad, No. 2473. The taller stem, the constantly glabrous and longer leaves, and the more southern range, would seem to make this plant worthy of varietal rank. Further field observations may, however, prove it to be but a form of the type, which occurs in the western extension of the State.

Lacinaria Garberi (A. Gray) Kuntze. This rare plant was very plentiful on the prairies near Palmetto, Manatee Co., No. 2430. Dr. Garber, in whose honor it was named, collected it first at Tampa.

CHRYSOPSIS FLEXUOSA n. sp.

Whole plant, with the exception of the involucres and upper surface of the leaves, copiously lanate, the hairs silky and deciduous. Stems 2–4 dm. tall, flexuous, ascending, branching above; leaves ascending, rough on the upper surface, oblong-linear to linear or linear-lanceolate, acuminate, often curved, about 5-nerved, those on the stem 3–6 cm. long, 2–8 mm. broad; involucres long-peduncled, cylindric-campanulate, about 1 cm. long, 6 mm. in diameter; scales of the involucre imbricated in 4–6 rows, linear to linear-lanceolate, acuminate, prominently keeled, glabrous or sparsely pubescent with long loose hairs; rays broadly linear to oval, 7–9 mm. long, usually shortly toothed at the apex.

In the pine lands at Bellair, Leon Co., about four miles south of Tallahassee, No. 2545. Nearest to *C. falcata*, from which it is readily distinguished by its much larger involucres, pubescence, and range. *C. falcata* Ell. is confined to the coast from Massachusetts to New Jersey.

ERIOCARPUM MEGACEPHALUM n. sp.

Plant much branched, about one metre in height. Stem and branches pubescent with short villous hairs, striate; leaves sparsely pubescent, sessile, lanceolate to linear-oblong, 2–7 cm. in length, 5–20 mm. broad, coarsely and remotely serrate with curved spreading teeth; short peduncles very villous at the summit and bearing a single head 2–3 cm. in diameter; involucres about 1 cm. high, its scales short-hispid, acute, linear to linear-lanceolate, the outer ones slightly shorter than the inner; rays numerous linear to linear-oblong, obtuse or acute, about 1 cm. long, 2–3.5 mm. broad.

Quite common on the south shore of Sneed's Island, near the mouth of the Manatee River, No. 2432.

PLUCHEA LONGIFOLIA n. sp.

Whole plant, particularly the inflorescence, pubescent with short villous hairs. Stem 6–10 dm. tall, branched at the summit; leaves crowded, erect or ascending, somewhat rough especially on or near the margins, denticulate or serrate, oblong or oval, those on the stem 6–16 cm. long, 2.5–5.5 cm. broad, the lower ones acute and sessile at the base, the upper ones truncate or rounded and slightly clasping at the base; inflorescence corymbiform, compact; involucres campanulate, 7–10 mm. long, exceeded by the slightly tawny pappus; scales of the involucre imbricated in 4–6 rows, ciliate, the outer ones broadly ovate and obtuse or apiculate, the innermost linear, acute.

Common in an open swamp just back of Titusville, Brevard Co., No. 2293. In the field the tawny white pappus makes the plant very conspicuous.

PLUCHEA IMBRICATA (Kearney) (*Pluchea foetida imbricata* Kearney). Further observation of this plant in the field convinces me that it is worthy of specific rank, and so I raise it to that distinction. It often attains a height of 1–2 metres, being much taller than *P. foetida*, which rarely exceeds 6 dm. in height. The color of the foliage is much different, giving the plant a purplish hue. In *P. foetida* the leaves are a dull green. The most marked difference between the two species lies in the time of flowering, *P. foetida* having matured its seed before *P. imbricata* is fairly in bud. There is a difference of some six weeks between the flowering periods.

Rudbeckia bupleuroides Shuttlw. Collected in the flatwoods at St. Marks, Wakulla Co., No. 2538. I visited this place early in September, a little too late to secure good specimens of this rare composite. By diligent search I managed to obtain about a dozen presentable plants. It grows in the swampy part of the flatwoods, in company with *Lacinaria spicata*, *Eryngium Ravenelii*, *and E. virgatum*.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE No.—90.

Studies in the Botany of the South-eastern United States.—V.

BY JOHN K. SMALL.

[Reprinted from The Bulletin of the Torrey Botanical Club, Vol. 23, No. 4, April, 1896.]

Studies in the Botany of the Southeastern United States.—V.

By John K. Small.

Asplenium Bradleyi D. C. Eaton, Bull. Torr. Club, 6: 11. 1873.

Although not extending the known geographic area, King's and Crowder's mountains, N. C., furnish two more stations for this rare fern. I found it on the two isolated peaks just mentioned, in the summer of 1894; it grew both on the cliffs at the summits and in crevices on large boulders on the slopes and at the base of the mountains. The leaves varied from less than one decimeter to between two and three decimeters in length.

Piaropus crassipes (Mart.) Britton, Ann. N. Y. Acad. Sci. 7: 241. 1893.

Mr. A. H. Curtiss informs me that this plant escaped from cultivation a few years ago and has now become a serious obstruction to navigation in the tributaries of the St. John's river. It has established itself in other parts of Florida.

Iris Caroliniana S. Wats. in A. Gray, Man. Ed. 6, 514. 1890.

In the spring of 1893 great quantities of this lately described *Iris* were found east of the great Dismal Swamp in Virginia by Dr. Britton and myself. During the spring of 1894 Tracy and Earle secured good fruiting specimens at Pointe du Chene, Louisiana (no. 2898), and last summer I found it very common in the swamps about Macon, Georgia, and throughout the middle part of that state.

MYRICA PUMILA (Michx.).

Myrica cerifera var. *pumila* Michx. Fl. Bor. Am. 2: 228. 1803.

It seems strange that this so-called variety of *Myrica cerifera* has never before been given specific rank.

CASTANEA NANA Muhl. Cat. 86. 1813.

Mr. Kearney has recently given us an excellent description* of this characteristic chinquapin. He omitted, however, the most striking character of the species. During last July and August I had an opportunity to observe *C. nana* at various points in southeastern Georgia, where it is plentiful and distributed in large patches over the hot sandy wastes. In its relatives, *Castanea dentata* and *C. pumila*, we find typical trunks or main stems developed above ground, but in the case of *C. nana* the main stem never rises to the surface of the soil, but grows along at the depth of one or several inches beneath the surface, sending up lateral branches at intervals. A comparative study of the anatomy of this stem would doubtless prove interesting.

ARISTOLOCHIA NASHII Kearney, Bull. Torr. Club, 21: 485. 1894.

Last July I collected good fruiting specimens of this plant along the Flint River, below Albany, Ga. The species is readily separable from the related *A. Serpentaria* by its more deeply lobed capsule, which is just about one-half as long. Mr. A. H. Curtiss has sent me specimens which he gathered in northeastern Florida several years ago.

PORTULACA CORONATA n. sp.

Rather stout, succulent, glabrous and somewhat shining, the roots fibrous, descending and freely branching; stem simple and erect, or diffusely branched from 1 or 2 cm. above the root, nearly terete, its branches spreading and ascending, bright flesh-colored or magenta, rarely lead-colored, the branches usually alternate, sometimes almost opposite, conspicuously articulated with the stem, the ends clavate and more or less tinged with green; leaves sessile or nearly so, the lower ones usually oblanceolate, the upper ones oblong or oblong-lanceolate, alternate, except a whorl of from three to eight at the ends of the branches, flat, obtuse or rarely acutish, conspicuously articulated with the stem, somewhat fugacious, bright green, inconspicuously ciliolate with depressed

---

* Bull. Torr. Club, 21: 261.

trichomes; midrib rather indistinct; flowers about 5 mm. broad, yellow; sepals 2 mm. long, triangular, sometimes broader than high, obtuse, hooded at the apex; petals small, 2 mm. long, ovate or oblong-obovate, obtuse, marked with five or seven nerves; stamens eleven or twelve; pistil 2 mm. long, three to four-cleft, the segments obovate or spatulate, well covered with stigmatic processes; capsule hemispheric or turbinate-hemispheric, 2–3 mm. long, 5 mm. in diameter, surmounted by a conspicuous crown, developed from the edge of the calyx where the lid joins the capsule; lid flattish, not crested, sometimes slightly depressed in the center; seeds twenty to forty, cochleate, gray, covered with acute or acutish pyramidal papillae.

Collected in September, 1894, just below the summit of Little Stone Mountain, De Kalb County, Georgia. It grows in company with *P. pilosa* in shallow depressions which have become partially filled with a sandy soil by the disintegration of the granite. There is a great contrast between it and the last named species, the plants are usually stouter, less dense in habit and the stems and branches bright magenta, whilst those of *P. pilosa* are of a light or dark shade of green. It is more closely allied to *P. lanceolata* Engelm. of southern and western Texas, from which it differs in the smaller flowers, and the sessile or nearly sessile leaves. The leaves are also different in shape and are never acute. The petals are not like those of *P. lanceolata*, and unfold in cultivated specimens about eight o'clock in the morning.

TWO SPECIES OF HIBISCUS.

Dr. Gray, in revising this genus for the Synoptical Flora, and in the fifth edition of his Manual, merged Michaux's *H. grandiflorus* into *H. lasiocarpus* of Cavanilles. It is difficult to understand on what grounds he did this, as the two species are so strikingly dissimilar. A comparison of their diagnostic characters is here given.

HIBISCUS LASIOCARPUS Cav. Diss. 3: 159. *pl.* 70. *f.* 1. 1787.

Hibiscus grandiflorus A. Gray, Man. Ed. 5, 102. 1867. Not Michx.

Stem pubescent, leaves ovate, the upper surface clothed with a dense pubescence consisting of long branched strigose-like hairs with a metallic or brownish-green tinge, the lower surface somewhat paler and less densely pubescent; calyx inconspicuously ribbed; bractlets as long as the calyx or longer, pectinate-ciliate; petals 6–8 cm. long; style slender, its branches not arising from the same point.

HIBISCUS GRANDIFLORUS Michx. Fl. Bor. Am. **2**: 46. 1803.

Stem glabrous; leaves hastate, three-lobed, broader than long (except the uppermost), the upper surface velvety with dense pubescence, bright green, the lower surface whitish, densely canescent; petioles glabrous; calyx prominently ribbed; bractlets about one-half the length of the calyx, velvety; petals 12–15 cm. long; style stout, its branches arising from the same point.

I have seen specimens of *H. grandiflorus* from several places in Florida. Michaux says it also occurs in Georgia and Mississippi. On the other hand *H. lasiocarpus* ranges from Louisville westward and north in the Mississippi Valley to Illinois and Missouri. Cavanilles gives a good figure of *H. lasiocarpus* which in no way suggests Michaux's plant.

NYMPHAEA ORBICULATA n. sp.

Perennial, robust, pubescent, except the upper surface of the leaves, bright green. Leaves orbicular or nearly so, 3–4 dm. in diameter, somewhat crisped, the lobes at the base conspicuously overlapping, the upper surface rough with irregular papillae, the lower surface pubescent with short shining silvery hairs, marked with numerous secondary nerves; petiole variable in length, faintly striate, clothed with silky pubescence, like the lower surface of the leaves; flowers about 6 cm. in diameter; sepals oblong-obovate, 5 cm. long, obtuse, somewhat eroded, faintly ribbed; disk 2 cm. in diameter; fruit subglobose, 4–5 cm. in diameter; seeds ovoid, 4.5 mm. long, with a ridge on one side.

Collected in a small lake near Thomasville, southern Georgia. In flower and fruit throughout July. Differs from *Nymphaea advena* in its orbicular leaves with their overlapping basal lobes, the peculiar pubescence and the ovoid seeds instead of the more nearly globose ones of that species.

CROTONOPSIS SPINOSA Nash, Bull. Torr. Club, **22**: 157. 1895.

I met with quantities of this very distinct species during the past summer in the valley of the St. Mary's River, in southeastern Georgia. In the field, as in the herbarium, this plant does not suggest *C. linearis*, its mode of growth and habit separating it at once. In Engler & Prantl we notice a figure of *P. spinosa*, which is intended to represent *P. linearis*. This shows that the species was collected some years ago and that a specimen found its way to Europe.

RHEXIA FLORIDANA Nash, Bull. Torr. Club, **22**: 150. 1895.

This *Rhexia*, hitherto known from but a single locality in Florida, is now known to occur in Georgia. I collected fine specimens of it during the past season north of the St. Mary's River, in the neighborhood of hammocks, in Charlton county. Their characters show nothing different from the originals, except that my specimens are more robust.

JUSSAEA SUFFRUTICOSA L. Sp. Pl. 388. 1753.

Dr. Carl Mohr has found this plant established on the river bank at Mobile, Alabama. This is the first record of its occurrence within the Southern States.

GAYLUSSACIA URSINA (M. A. Curtis) T. & G.; Gray, Mem. Amer. Acad. (II). **3**: 49. 1846.

While in the mountains of northern Georgia, in the summer of 1893, I found this rare *Gaylussacia* at three localities. It is quite scarce in the canon at Tallulah Falls and produces little fruit, but some miles north, on the North Carolina boundary, the damp mountain slopes about Estotoah Falls and the Thomas Bald are covered with the shrub, growing from one to four feet tall and producing quantities of the large black fruit, which is not at all insipid, as has been stated. On some mountains it covers areas many acres in extent.

CYNOCTONUM ANGUSTIFOLIUM (T. & G.).

Mitreola sessilifolia var. *angustifolia* T. & G. Fl. N. A. **2**: 45. 1841.

Annual, or perennial (?), slender, glabrous, pale green and *Sabbatia*-like. Stems erect, 2–6 dm., simple or sparingly branched above, virgate; leaves varying from narrowly lanceolate, 2–4 cm. long, somewhat fleshy, becoming thin in drying, obtuse or acutish at the apex, entirely sessile or the lowest short-petioled, not prominently nerved; flowers usually in a somewhat compound terminal cyme; calyx narrowly campanulate, 2.5–3 mm. long, parted to below the middle, its segments ovate-lanceolate, obtuse, denticulate; corolla at length much longer than the calyx, whitish, 3–5 mm. long, marked with dark stripes (3 to each segment), its tube somewhat constricted at the throat, about as long as the linear-lanceolate, erect or converging, rather obtuse segments; capsule sessile or nearly so, 4 mm. long, its two horns slightly longer than the body, converging; seeds brown, .3 mm. long, ovoid, rather pointed at the apex, slightly and minutely pitted.

Original locality, Middle Florida. In wet places, southern Georgia and Florida.

Rudbeckia bicolor Nutt. Journ. Acad. Phila. 7: 81 (1834).

This species of more western distribution has been collected in eastern Florida. Mr. A. H. Curtiss has found it growing in pine barrens near Jacksonville (no. 4759). Some years since he secured it in fertile fields in Duval county, but distributed it under the name of another species (no. 1423). In 1894 Prof. Tracy secured a remarkably slender form at Biloxi, Mississippi (no. 2896).

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE No.—91.

Blue-eyed Grasses of the eastern United States (Genus Sisyrinchium).

BY EUGENE P. BICKNELL.

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 23, No. 4, April, 1896.]

The Blue-eyed Grasses of the eastern United States (Genus Sisyrinchium).

By Eugene P. Bicknell.

(Plates 263–265).

No conclusive answer has yet been given to the old question whether there exists more than one East American species of Blue-eyed Grass. The common resource of throwing together under one name all eastern specimens belonging to the genus is easy botany but poor morals. Neither does the recognition of two forms or species satisfy the botanical conscience. It would appear that only when we take notice of three or more kinds of Blue-eyed Grasses do we find ourselves bearing somewhere near the truth. It matters little whether these *kinds* be rated, according to the conceptions of different minds, as species or as forms of less signal rank; the pith of the matter lies in this, that each kind upholds a certain definite type of individualization which has been established in nature.

I venture to propose a new eastern species in this confused genus only on the authority of facts perfectly clear to my mind. Nor do I doubt that any student who may approach the subject guided by out-of-doors study will reach views not greatly at variance with my own.

Nomenclature.

An inquiry into the nomenclature of the East American forms of *Sisyrinchium* discloses the unsuspected fact that our common Blue-eyed grass of the Atlantic States is without any available name. The plant has been variously known as *S. Bermudianum* L., *S. angustifolium* Miller and *S. anceps* Cav. These names are in indiscriminate use to-day.

It has been a subject of disagreement whether the name *Bermudiana* of Linnaeus belongs more properly to the Bermudan than to the American plant. The title of the insular species is certainly not without a slight flaw of indirection; on the other hand it can scarcely be held that the claim of the continental plant is better founded—its support involves an undue insistence on merely technical points at best of uncertain bearing in this particular case. In these circumstances that course seems to be right which unreservedly concedes the name *Bermudiana* to the Bermudan plant.

But even in its time-honored employment in American botany the name *Bermudiana,* it appears, has been used to designate quite another form of *Sisyrinchium* than the one to which it was applied in Species Plantarum. Its application by Linnaeus was not at all, or only in doubtful part, to the plant of our Atlantic seaboard which has borne the name—the plant with broadly-winged, branching stem and subequal spathal bracts. The species which was primarily, if not solely designated by Linnaeus, is the plant of more northward extension, having a slender, simple stem and unequally bracted spathe, which has been known by Michaux's name, *mucronatum.* Linnaeus's description is distinctive of neither species, but his plant was based on Plukenet (Phyt. *pl. 61, f. 1.* 1691, and Almag. 345, 1696) and on Dillenius (Hort. Elth. 49, *pl. 41, f. 49.* 1732). Plukenet both by description and illustration is perfectly clear; his plant is the one we have been calling *mucronatum.* It may be added that the precedence given to the American over the Bermudan plant in Species Plantarum is in conformity with the numbering of Plukenet's figures, which, singularly enough, reverses the order of the figures themselve, and of the descriptions as well.

The exact plant of the Species Plantarum is so perfectly established by the primary reference to Plukenet that it is of little consequence to find that Dillenius is ambiguous. Watson, indeed, has interpreted the Dillenian plant as being the equivalent of our so-called *mucronatum.* Still, the figure in Hort. Elth. appears to represent, in part at least, our Atlantic States plant, and it would thus seem probable that Dillenius actually had both species, but failed to distinguish between them. This, however, is fortunately not now material to the proper assignment of names.

First after Linnaeus, Miller (Dict. ed. VII., 1759) discussed the American plant, as he understood it, naming it *S. angustifolium* and citing Dillenius. To the extent of this citation the exact significance of Miller's name might be held to be doubtful, but his description, as Watson has emphasized, points unmistakably to our simple-stemmed plant. Whatever doubt of this might otherwise have been is forestalled by Miller himself. In his "Gardeners' and Botanists' Dictionary" (1807) he redescribes his plant in clear terms, adopting for it the name *S. anceps* Cav., and citing his own earlier name as a synonym. The bearing of *S. anceps* Cav. is not doubtful; the plant falls conclusively into line with that of Linnaeus and of Miller as our simple-stemmed species.

The true name of this plant is thus found to be *S. angustifolium* Miller, as Watson has already maintained (Proc. Am. Acad. 24: 86–7).

The name *S. anceps* Cav. was adopted by Watson for our branched species on the ground that Cavanilles' illustration shows one plant bearing a short branch. The remaining evidence of the figures, as well as the unequivocal text, was thus quite unaccountably overlooked. As a matter of fact, also, *S. angustifolium* sometimes develops a short lateral branch, just as the figure shows.

Earlier than Cavanilles, Lamarck described the American plant as *S. gramineum* from specimens cultivated in France (Encyc. 1: 408. 1783). His description is entirely satisfactory and identifies his plant perfectly with Miller's *S. angustifolium* described from specimens cultivated in England.

The synonomy of *S. angustifolium* will therefore stand as follows:

S. angustifolium Miller, Dict. ed. VII. (1759).
S. Bermudiana L. Sp. Pl. 954. In part. 1753.
S. gramineum Lam. Encyc. 1: 408. 1783.
S. anceps Cav. Diss. 6: 345. *pl. 190, f. 2.* 1788.
S. mucronatum Michx. Fl. Bor. Am. 2. 33. 1803.

The first clear presentation of our branched species was by

Curtis (Bot. Mag. *pl. 464. 1799*), who gives an excellent illustration of our exact plant naming it *S. gramineum.* This name, however, as we have seen, was preoccupied through its use by Lamarck. The curious fact thus develops that this plant appears never to have been described under a name not a synonym of *S. angustiolium.* It may now, therefore be called *S. gramnoides.*

Our eastern Species of Blue-Eyed Grass.

SISYRINCHIUM GRAMINOIDES nom. nov.

S. gramineum Curtis, Bot. Mag. *pl. 464.* 1799. Not *S. gramineum* Lam. Encyc. 1: 408. 1783.

S. Bermudianum of American authors, not Linnaeus.

S. anceps S. Watson in A. Gray's Manual, Ed. 6, 515. Not Cavanilles.

Specific Characters: Green or subglaucous, drying dark; stem bifurcate, winged; leaves thin; stem and leaves with scabrous edges, 1″–3″ wide; bracts of spathe subequal, acuminate; floral-scales brownish-tinged; capsule large, 1½″–3″ wide; seeds ½″ or more in diameter, pitted.

Commonly over 1° high (6′–2°); green or somewhat glaucous, usually drying dark. Stems wing-flattened, mostly 1½″–2″ wide (1″–3″), the wing-margins perceptibly broadened upward from base to top. Leaves thin and grass-like, as broad as the stem and from one-half to three-quarters its length, or rarely equalling it, minutely serrulate or denticulate on the edges, as are the stem and the branches, or usually so. Stem dividing above or from about the middle into two (exceptionally three or four) branches 2′–8′ long, subtended by a conspicuous grass-like leaf which is slightly narrowed above the compressed-clasping base and broadened higher up, as are the larger basal leaves. Branches winged, mostly suberect and unequal, but variable, usually the inner one elongated and erect, the outer one about half its length, often curved, broader, sometimes over 1″ wide with its margins passing uninterruptedly into the continuous spathe; rarely the outer branch may be the longer, or the two may be subequal; occasionally the outer one divides into two peduncles subtended by a leafy bract. Not infrequently simple and leafless scapes rise among the normally branched ones, simulating the stem of *S. angustifolium.* Bracts of spathe usually green and herbaceous (sometimes purplish), compressed, usually serrulate-scabrous on the keel, the outer one with scarious margins usually only below the middle, subequal (occasionally the outer one is sowewhat elongated, especially when the scape is simple); inner bract narrowly acuminate or acute, 6″–10″ long. Hyaline floral scales narrow, becoming distinctly brownish-tinged. Divisions of perianth 4″–5″ long, 1½″–2″ wide, sparsely pubescent on outer surface. Young capsule pubescent as in our other species. Capsules usually 3 or 4 (exceptionally more) subglobose, about 2″ long and broad (1½″–3″), disposed to be spreading or even recurved on slender pedicels 8″–12″ long. Seeds .04–05 in. in diameter, black, globose, more or less pitted. (Plate 263.)

Eastern States south from Massachusetts, but exact distribution not well made out.

Grassy places generally, preferably in damp soil; sometimes it occurs in shaded woods, where it is deep green and forms large separate tufts producing a profusion of finally prostrate stems. In drier, open situations it is erect and somewhat glaucous; among deep grass in low grounds the stems may be weak and ascending, and the tufted habit nearly or quite lost.

Several specimens from coastwise localities from New Jersey southward agree in having three and four clustered branches, decidedly purplish spathes, narrow stem and narrow attenuate leaves. Specimens from Florida, which will doubtless prove to be separable, are coarser in habit with elongated narrowly attenuate, even flexuous leaves often exceeding the stem, short, clustered peduncles, the bracts of the spathe strongly white-margined, the inner bract commonly longer than the outer one, the hyaline floral scales long and often exerted beyond the bracts.

SISYRINCHIUM ATLANTICUM n. sp.

Specific Characters: Pale and glaucous, not drying dark; stem slender and wiry, branched, margined or narrowly winged; stem and leaves ¼″–1″ wide, very smooth, leaves rather stiff; bracts of spathe subequal; inner bract obtuse or truncate; floral scales silvery white; capules oblong ¾″–1½″ wide; seeds ¼″–½″ in diameter, pitted or nearly smooth.

Much slenderer than *S. graminoides*, when growing with it mostly taller. Pale and glaucous, not drying dark; very smooth except the branches and tips of the leaves which are minutely denticulate-scabrous. Stem often inclined or becoming prostrate, much longer than the leaves, 8′–2° high, slender and rather wiry, uniformly margined or narrowly winged, often subterete at base, usually less than 1″ wide, sometimes only ¼″, dividing above into two (1–3) short slender branches, or the outer branch elongated as a spreading prolongation of the stem and again branched. Occasionally a simple stem is developed, its spathe sometimes showing a slightly elongated outer bract. Leaves rather firm and stiff, narrow, 1″ wide or less, attenuate often arcuate, from ¼–¾ the length of the stem. Stem-leaf much smaller and narrower than in *S. graminoides*, scarcely or not at all broadened above. Branches slender, even filiform, narrowly margined, especially the outer one, 1½′–4′ long, mostly short and subequal, either parallel or somewhat spreading, when branched again often widely spreading, geniculate at the node and bearing a secondary leaf. Stem and branches usually purple-spotted and slightly constricted at the nodes and below the spathes. Spathes as a rule plumper and more narrowed at the base than in *S. graminoides*, often deflected, the bracts subequal, somewhat membranous, usually purplish; outer bract commonly with white scarious margins extending to the tip; inner bract 5″–8″ long, broader than in *S. graminoides*, the tip white-scarious, rounded or truncate, or even retuse, the midvein excurrent as a minute point. Hyaline floral scales mostly longer and broader than in *S. graminoides*, clear white. Divisions of perianth generally shorter and broader than in *S. graminoides*, 4″–4½″ long, 1½″–2½″ wide, finely pubescent on outer surface. Capsules 2–7, usually 5, oblong, ¾″–1½″ wide, 1″–2″ long, at maturity more contiguous than in *graminoides* on shorter suberect pedicels, the valves usually thicker; pedicels often flattened and finely margined. Seeds .02–.04 inches in diameter, subglobose, dark, finely wrinkled-pitted to nearly smooth. (Plate 264).

East Massachusetts to Florida, mostly near the coast in sandy soil, or about the borders of salt marshes. It may be either densely caespitose or of scattered growth.

I have observed this plant closely for a number of years in Van Cortlandt Park, New York City, where it grows in abundance over a low field bordering a brackish marsh often in company with *S. graminoides*. The two plants as they grow together are seen to be clearly distinct and no intergrading forms are found. I have also collected the plant on the New Jersey coast, and Dr. Britton informs me that it is the common species on Staten Island.

SISYRINCHIUM ANGUSTIFOLIUM Miller.

Low, commonly 6′–8′ high (3′–14′), pale and glaucous, usually strict and stiff. Leaves narrow, from almost setaceous to 1″ wide (rarely more lax, and 1½″ wide), sometimes equalling or exceeding the stem but mostly about one-half its length; edges of leaves and stem either smooth or minutely serrulate or denticulate. Stem simple (rarely with a short lateral branch), narrow, ½″ or less to

1″ wide, slightly winged or merely margined, terminated by the solitary spathe, or with two spathes geminate within the enclosing outer bracts. Bracts often conspicuously purplish, very unequal, the outer one commonly twice the length of the inner, sometimes rigidly prolonged to four times its length, becoming over two inches long, sometimes minutely papillose or even papillose-puberulent; inner bract often appearing gibbous in the spathe, 6″–12″ long, attenuate or acute. Flowers variable, sometimes very delicate on slender curved pedicels, often large with the pedicels strict and erect; divisions of perianth sometimes 6″ long, the broader series 2½″ wide, minutely pubescent on outer surface; floral scales either clear white or brownish-tinged. Capsules 1–9, globose, often larger than in *graminoides*, on straighter, less exserted pedicels, seeds often larger than in *graminoides*, .04–.06 in. long, mostly obliquely obovate-oblong, often angled, brownish, smooth or with coarse shallow pitting. (Plate 265.)

In damp or dry soil, sometimes on sterile hills and in dry upland pastures.

From Newfoundland to Saskatchewan, south to Connecticut and New York and along the mountains to North Carolina, in the interior to Kentucky, Missouri and Kansas.

It would appear from the foregoing description of *S. angustifolium* that the species is subject to not a few rather striking variations. I have little doubt, however, that my description embraces rather a group of closely related plants than the mere range of variation shown by a single one. In the material at command, however, I cannot find any certain warrant for the subdivision of the group, nor can I fully assure myself as to the value of any one of the apparently several component forms. It is probable, indeed, that study of these plants in life shall have to lead the way to the correct understanding of their relationships.

The true *S. angustifolium* would appear to range from Newfoundland far westward through Canada and southward through the Alleghenies to North Carolina, finding in Connecticut and New York its southern limit near the coast. Specimens agree generally in drying blackish like *S. graminoides*, and in having the edges of stem and leaves decidedly rough-serrulate. At the southern limit of its coastwise range this form seems to show a closer affinity to *S. graminoides*, and it is in plants from this region that a short lateral branch is occasionally found. It is quite possible, therefore, that plants practically intermediate between this form and *S. graminoides* may occur, especially as starved forms of the latter would naturally tend to assume the general character of *S. angustifolium.*

An Allegheny Mountain form of *S. angustifolium* is very slender and delicate, with highly-colored spathe and linear-elongated outer bract; the edges of the stem, in certain specimens at least, is perfectly smooth. This form also turns blackish in drying.

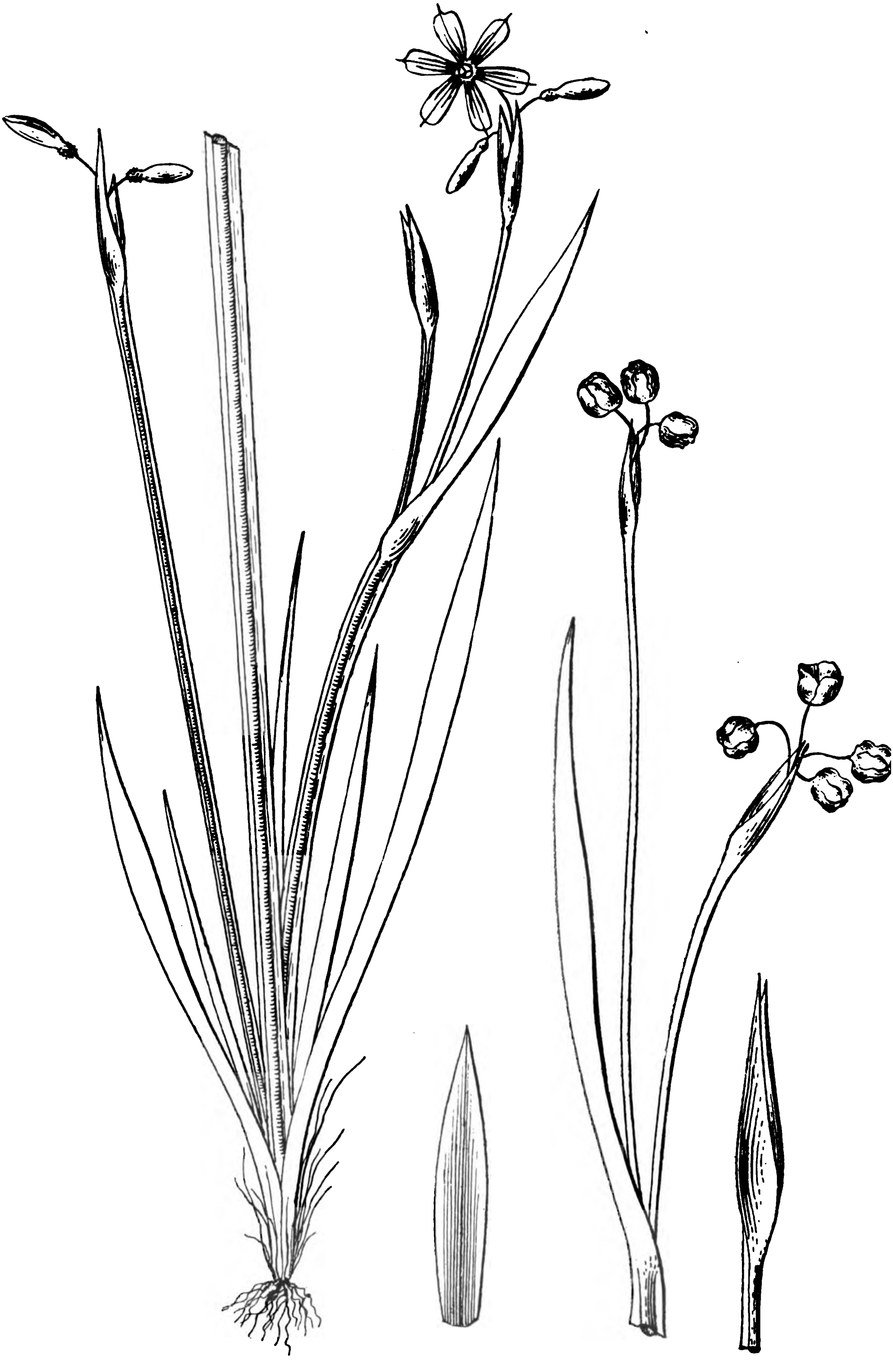
Plants from the prairie region, from Minnesota to Kansas, do not blacken in drying, and commonly have the edges of the stem and leaves perfectly smooth. The bracts of the spathe are often minutely papillose or even puberulent, a character of which I have found no suggestion in eastern specimens. Both East and West, however, furnish ambiguous plants which seem to contradict the indications of the general run of specimens from each region.

Among the large number of specimens examined, three only have geminate spathes. These specimens are all from the same general region, viz., Kentucky, Missouri and Illinois. Collectors' notes on two of them record "flowers white;" another is labeled further by Dr. Englemann "*S. albidum*, Raf., Dry Hills, St. Louis, earlier than the blue form, May, 1863."

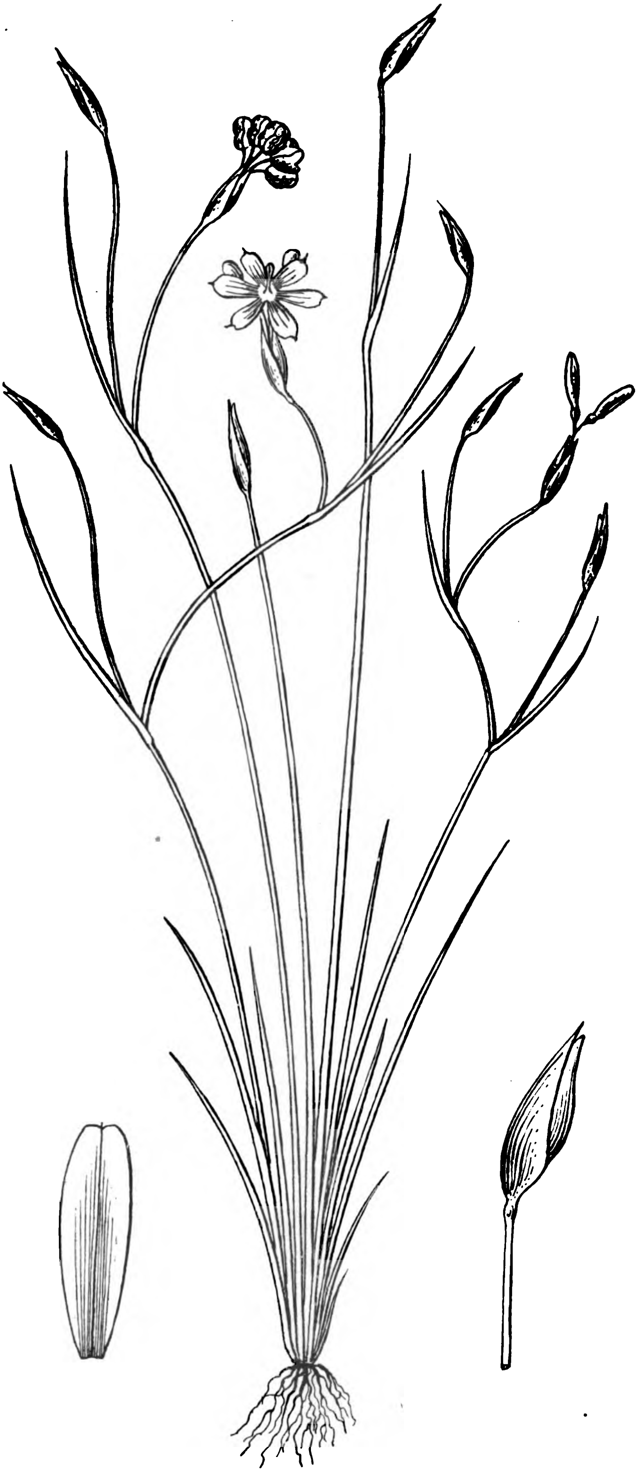
In Rafinesque's description of his *S. albidum** (Atlantic Journ. 17, 1832) we read "spathe unequally 4 valved," the habitat of the plant is given as "in West Kentucky." These developments certainly point strongly to the validity of *S. albidum* Raf., and suggest a promising subject of field study to anyone who may be in a position to prosecute it.

---

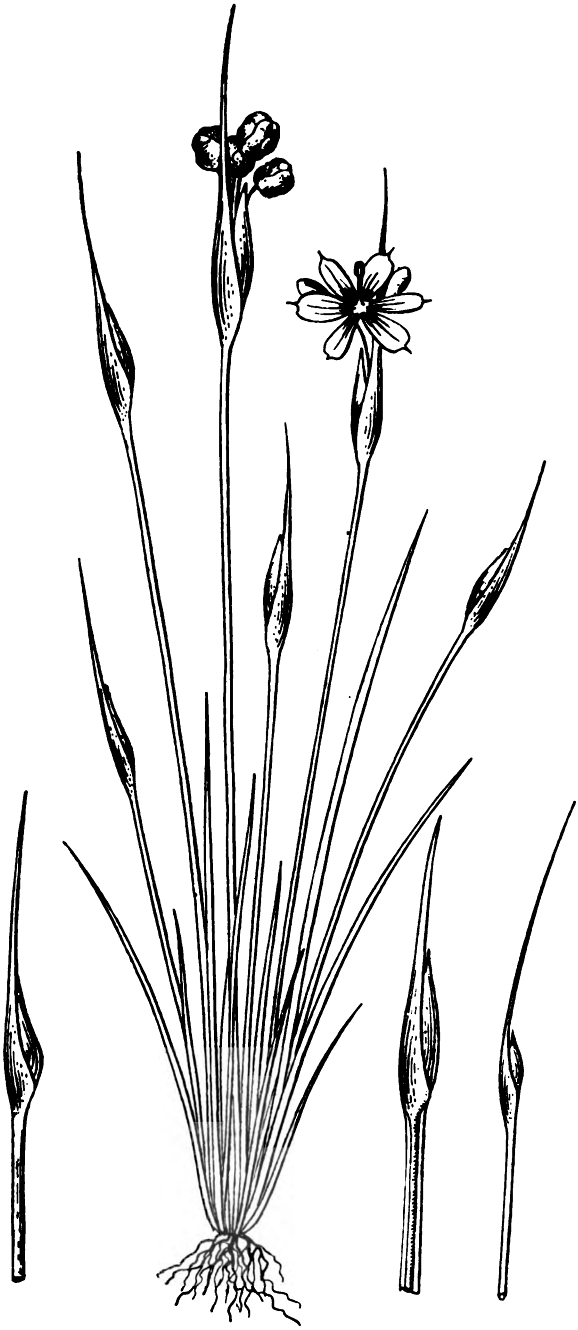
*It may be stated here as a matter of record that, eight years prior to his description of *S. albidum*, Rafinesque wrote the plant down without description as *S. album* Raf. So it will be found printed in the "First Catalogues and Circulars of the Botanical Garden of Transylvania University at Lexington, in Kentucky, for the year 1824," p. 16. This reference is wanting in Index Kewensis.



SISYRINCHIUM GRAMINOIDES BICKNELL.



SISYRINCHIUM ATLANTICUM BICKNELL



SISYRINCHIUM ANGUSTIFOLIUM MILL.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE No.—92.

New or noteworthy American Grasses.–IV.

BY GEO. V. NASH.

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 23, No. 4, April, 1896.]

New or noteworthy American Grasses.—IV.

By Geo. V. Nash.

Panicum consanguineum Kunth, Enum. Pl. 1: 106. 1833.

Panicum villosum Ell. Bot. S. C. & Ga. 1: 124. 1817. Not Lamarck, 1791.

Dr. John K. Small collected in Georgia, in 1895, a *Panicum* which well accords with the description given by Elliott of his *P. villosum;* in fact, it agrees so closely that I have little hesitation in referring it to that species, especially in view of the fact that it comes from a section of the country with the flora of which Mr. Elliott was familiar. Dr. Small secured the early and simple state of this grass in the Ocmulgee River swamp, below Macon, in May; the later and much-branched form was collected by him at Darien Junction, McIntosh county, in June.

The name *villosum* had been previously applied by Lamarck to an entirely different plant, so Elliott's name becomes a homonym. The oldest available name, so far as I have been able to ascertain, is the *P. consanguineum* of Kunth, who founded his species on the *P. villosum* of Elliott. A number of different forms have been referred from time to time by various authors to this species, but I have hitherto seen none that so perfectly answers to Elliott's description as does this plant.

A description of Dr. Small's plant is appended:

Culms at first erect and simple; later decumbent or nearly prostrate and branching at every node, forming large spreading clumps. In the early and simple state the whole plant, excepting the glabrous basal leaves and panicles, is strongly villous; in the late and much-branched stage the culm leaves are often glabrous; nodes barbed; sheaths shorter than the internodes, even on the branches; ligule a dense ring of long white hairs; basal leaves spreading, lanceolate to ovate-lanceolate, 2.5–6 cm. long, 7–12 mm. wide; culm leaves linear-lanceolate, erect, stiff, particularly in the branched state, the primary ones somewhat narrowed into a rounded base, 6–12 cm. long, 4–7 mm. wide, the leaves on the branches 3–7 cm. long, 3–5 mm. broad, rounded or truncate, but not narrowed at the base; panicles glabrous, the primary ones exserted, ovate in outline, 5–6 cm. long, the branches not numerous, ascending, 2.5 cm. long or less, flexuous, bearing 2–6 spikelets, the secondary panicles much smaller, concealed among the leaves, their branches shorter and erect with fewer spikelets; spikelets obovate, 2.5 mm. long; first scale whitish, nearly orbicular, about one-quarter as long as the spikelet which it clasps at the base, glabrous, one-nerved; second and third scales of equal length, broadly oval, green and membranous, 7-nerved, strongly papillose-pubescent; fourth scale broadly oval or approaching orbicular, apiculate, abruptly narrowed at the base, striate, white and chartaceous, about 2.25 mm. long; palet chartaceous, slightly shorter than the fourth scale.

PANICUM ERECTIFOLIUM nom. nov.

Panicum sphaerocarpon var. *Floridanum* Vasey, Bull. U. S. Dept. Agric. Bot. Div. 8: 33. 1889. Not *P. Floridanum* Trin.

Glabrous. Culms 4–6 dm. tall, erect, stiff, simple or sparingly branched, leafy; sheaths loose, often ciliate on the margins, the basal ones crowded and overlapping, those at the middle of the culm about one-half as long as the internodes, the uppermost sheath usually elongated; ligule a ring of short hairs; leaves ciliate toward the base, the basal ones spreading, ovate-lanceolate, 1.5–4 cm. long, the next succeeding erect, lanceolate, acuminate, 9–11-nerved, longer and gradually reduced in size toward the summit of the culm, the lower 7–14 cm., the uppermost 2.5–6 cm. long, panicle finally long-exserted, ovate to oblong in outline, 7–12 cm. long, its branches ascending, much divided, the lower ones 3–7 cm. long; spikelets numerous, purplish, shorter than their pedicels, oval, obtuse, about 1.5 mm. long; first scale membranous, one-quarter as long as the spikelet or less, ovate or triangular, 1-nerved: second and third scales of equal length, membranous, more or less pubescent, 7-nerved; fourth scale yellowish white, chartaceous, broadly oval, about 1.5 mm. long; palet chartaceous, about as long as the fourth scale.

This grass appears to be confined to Florida, and does not occur plentifully. It was found in some abundance by the writer in an old muck bed near Eustis, Lake Co., in 1894, No. 1012. The plant collected by A. H. Curtiss, No. 3599, and distributed as *P. microcarpon*, belongs here.

Its affinity is with *P. sphaerocarpon* Ell., but it is distinguished from that species by its longer and erect leaves, the smaller spikelets and the more southern range.

PANICUM VILLOSISSIMUM n. sp.

Whole plant densely villous. Culms 3–6 dm. tall, erect or ascending; nodes barbed; sheaths about one-half as long as the internodes; ligule a ring of long hairs; leaves linear-lanceolate, 5–10 cm. long, 4–9 mm. wide, erect, somewhat narrowed toward the rounded base, yellowish green, 7–11-nerved; panicle long-exserted, broadly ovate in outline, 6–10 cm. in length, its branches spreading or ascending, somewhat flexuous, the lower ones 3–6 cm. long; spikelets shorter than their pedicels, elliptic, 2.5 mm. long, about 1.25 mm. broad, obtuse or acutish, purplish; first scale membranous, ovate, acute, 1-nerved, one-third to one-half as long as the spikelet; second and third scales equal in length, membranous, 7-nerved, strongly papillose-villous; fourth scale chartaceous, yellowish white, elliptic, slightly exceeding 2 mm. in length, 1.25 mm. broad, acutish, somewhat striate; palet chartaceous, about as long as the fourth scale.

A distinct and well-marked species. Collected by Dr. John K. Small in the Ocmulgee River swamp, below Macon, May 18–24, 1895. Only the early and more simple state was secured. The later and much-branched condition is probably very similar to many other forms of the dichotomum group.

PANICUM WEBBERIANUM n. sp.

Whole plant, with the exception of the lowermost sheaths and the ciliate margins of the upper ones, glabrous, the culms, sheaths and leaves often purple. Culms 2–4 dm. tall, erect or ascending, rigid, more or less branched, forming moderate-sized clumps; sheaths loose, shorter than the internodes; ligule very short, minutely ciliate; leaves lanceolate, 4.5–9 cm. long, 7–14 mm. wide, somewhat narrowed toward the rounded or subcordate sparsely ciliate base, usually erect, smooth or sometimes a little roughened, 7–11-nerved; panicle finally long-exserted, ovate in outline, 6–9 cm. long, its branches widely spreading, rarely ascending or reflexed, more or less flexuous, the lower ones 2-3 cm. long, the ultimate divisions of the longer branches generally spreading; spikelets equalling or longer than their pedicels, elliptic or obovate, 2.5 mm. long; first scale nearly hyaline, broader than long, rounded at the apex, about one-quarter the length of the spikelet, which it clasps at the base; second and third scales of equal length, green and membranous, 7-nerved, minutely pubescent, the latter enclosing a small narrow palet about one-half as long as the scale; fourth scale yellowish white, chartaceous, oval, about 2 mm. long, 1.3 mm. broad, minutely pubescent at the obtuse apex, striate-punctate, enclosing a palet of equal length and similar texture and a perfect flower.

Collected by the writer on the edge of a clay pit in the low pine land at Eustis, Lake Co., Florida, May 16–31, 1894, No. 781. This has somewhat the appearance of the *P. demissum* of Trinius, particularly as to the panicle, but the leaves and spikelets are considerably larger, and the whole plant more robust.

Named in honor of Mr. H. J. Webber, of Eustis, Florida.

PANICUM VIRGATUM BREVIRAMOSUM n. var.

Glabrous throughout. Culms 1 metre tall or less, erect, slender, strict, purplish at or near the nodes; sheaths shorter than the internodes; ligule a ring of long hairs; leaves narrowly linear, 1.5–3 dm. long, 3–7 mm. wide, long-acuminate, usually narrowed toward the base, erect, strict, smooth beneath, a little roughened above; panicle oblong, 9–13 cm. long, 3–5 cm. wide, its branches ascending, the lower ones 5 cm. long or less; spikelets numerous, slightly less than 3 mm. long, purplish; first scale about one-half as long as the spikelet, acute or obtuse, 5–7-nerved; second and third scales equal in length, acute, 7-nerved, the intervals between the nerves of the former gradually decreasing in width, the interval between the midnerve and first lateral nerve of the third scale much wider than the intervals between the other nerves, palet empty, hyaline, shorter than the scale; fourth scale elliptic, 2.25 mm. long, obtuse, chartaceous, whitish, enclosing a palet of similar texture and a perfect flower.

Collected by Dr. Small in clay soil in the pine lands about Augusta, Georgia, where it was common, June 27–July 1, 1895. The culms occur singly or two or three together, not forming large clumps as does the nothern form; the thick scaly rootstocks, usually so manifest in the type, are almost entirely wanting in this form. The spikelets are smaller, hardly 3 mm. long, and the branches of the panicle much shorter than in any form hitherto observed. These differences, together with its more southern range, would seem to warrant its separation as a variety.

CHLORIS TEXENSIS n. sp.

Smooth and glabrous, light green. Culms 3–6 dm. tall, flattened at the base; sheaths compressed, those at the base of the culm short and crowded, the uppermost one elongated; leaves 2.5–15 cm. long, 2–6 mm. wide, smooth beneath, scabrous above and on the margins, obtuse; inflorescence usually exserted; spikes 5–8, 10–18 cm. long, pilose at the base; rachis triangular, scabrous on the angles, flexuous; spikelets about 4 mm. long, exclusive of the awns; empty scales narrowly lanceolate, acuminate, 1-nerved, scabrous on the keels, the first about two-thirds as long as the second which about equals the third scale; third scale slightly less than 4 mm. long, lanceolate, 3-nerved, ciliate on the margins toward the apex, the rough awn 6–8 mm. long, inserted just below the apex, the keel sometimes sparingly pubescent, scabrous toward the summit; fourth scale 2–3 mm. long, lanceolate, the acute apex about even with the summit of the third scale, the scabrous awn 4–5 mm. long, inserted just below the apex.

Collected in Texas by both Thurow and G. C. Nealley.

Related to *C. verticillata* Nutt., but abundantly distinct The generally longer and narrower leaves, the spikelets more appressed to the rachis, the narrower and differently shaped third and fourth scales readily separate it from that species. In *C. verticillata* the third scale is 2.5 mm. long or less, and the fourth scale not over 2 mm. long, obovate or obovate-cuneate, truncate or obliquely so at the apex.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE.—No. 93.

OEnothera and its Segregates.

BY JOHN K. SMALL.

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 23, No. 5, May 1896.]

OEnothera and its Segregates.

BY JOHN K. SMALL.

The year 1835 marks a great crisis in the history of the genus *OEnothera* of Linnaeus. Edouard Spach then divided the genus into about a dozen, taking his characters from the flower and fruit The results of his observations were published in the Annales des Sciences Naturelles,* Histoire Naturelle des Végétaux,† and in his Monographia Onagrearum published in Nouvelles Annales du Muséum,‡ the last named work containing a complete exposition of his conclusions. Although Spach's work was considered good and reliable, his generic lines were not generally accepted, but were used to divide the composite genus *OEnothera* into sections.

Spach, however, was not the first to see that *OEnothera* contained many generic types. In 1763 Adanson published *Onagra*, Rafinesque established *Meriolix* in 1818, in the same year Link separated *Chamissonia* (not *Chamissoa* H.B.K.), and later several genera were proposed by Nuttall.

Between 1835 and the present time authors have at one time or another eliminated one or two genera from *OEnothera*, but it was not until 1893, when Rud. Raimann prepared the Onagraceae for Engler and Prantl's Natürlichen Pflanzenfamilien,§ that any systematic or logical subdivision of the genus into several genera appeared. Raimann's conclusions are based on Spach's work, but he has presented them in a much more satisfactory manner than was indicated by the earlier author.

---

*(II.) 4: 163–168.

†4: 347–379.

‡(III.) 4: 321–407.

§3: Abt. 7. 199–223.

The committee which prepared the List of Pteridophyta and Spermatophyta of Northeastern North America,* adopted Raimann's interpretation, and it was suggested by Dr. Britton that I make an examination of the material in the Herbarium of Columbia University to ascertain to what extent the characters hitherto assigned for generic lines held. The study has been interesting both from a generic and a specific standpoint in exposing the strong tendency to mass, and to maintain composite species and genera where clear and constant characters exist both in habit and in the more minute morphology.

The following pages contain the results of these observations on the North American species.

I will be glad to receive additional material, either specimens or seeds, for examination. Proposing to present a monograph of this group at an early day.

Key to the Genera.

Flowers regular (stamens equal in length.)
  Stigma deeply four-cleft, its segments linear.
    Ovules and seeds horizontal, inserted in two or rarely in several rows, prismatic-angled. 1. ONAGRA.
    Ovules and seeds ascending, not angled.
      Buds erect; flowers yellow; ovules and seeds in one row. 2. OENOTHERA.
      Buds drooping; flowers pink; ovules and seeds in two rows. 3. ANOGRA.
  Stigma entire or rarely four-toothed.
    Ovaries and capsules sessile or nearly so, subglobose or elongated.
      Calyx-tube longer than the ovary.
        Stigma capitate; calyx-tube slender, usually adherent to the style. 10. TARAXIA.
        Stigma disk-like; calyx-tube funnelform. 11. GALPINSIA.
      Calyx-tube shorter than the ovary.
        Stigma disk-like, slightly four-toothed; calyx-tube broadly funnelform, sometimes twice shorter than the ovary. 12. MERIOLIX.
        Stigma capitate; calyx-tube campanulate or somewhat funnelform, many times shorter than the ovary.

---

* Mem. Torr. Club, 5.

Capsules incompletely four-celled; calyx-tube with a lobed disk in its throat. 13. EULOBUS.
Capsules with complete septa; calyx-tube naked at the throat. 14. SPHAEROSTIGMA.
Ovaries and capsules long stalked, more or less club-shaped. 15. CHYLISMA.
Flowers irregular (the alternate stamens longer).
Ovules and seeds numerous, not tuberculate, clustered on slender funiculi; capsules club-shaped.
Flowess yellow 4. KNEIFFIA.
Flowers red, purple or white. 5. HARTMANNIA.
Ovules and seeds few, sessile, in one or two rows.
Plants normally acaulescent.
Capsules obtusely or retusely four-angled; seeds with a deep furrow along the raphe. 6. PACHYLOPHUS.
Capsules sharply four-angled; seeds with a tubercle at one end. 7. LAVAUXIA.
Plants caulescent.
Stems diffuse and wiry; leaves 1–2 cm. long; capsules sharply four-angled. 8. GAURELLA.
Stems not diffuse, stout; leaves 4–15 cm. long or longer; capsules broadly winged. 9. MEGAPTERIUM.

1. ONAGRA Adans. Fam. Pl. 2: 85. 1763.

Plants annual or biennial.
Flowers small; petals 2–4 mm. broad. 1. *O. cruciata.*
Flowers large; petals one or several centimeters broad.
Calyx-tubes slender, 2.5–5 cm. long.
Stems decumbent; pubescence rather dense, short and appressed. 2. *O. depressa.*
Stems erect or nearly so.
Pubescence villous-hispid, strigose or soft and appressed; species ranging east of the Rocky Mountains.
Capsules 2–2.5 cm. long, abruptly narrowed at the apex 3. *O. biennis.*
Capsules 3–4 cm. long, gradually narrowed from near the base. 4. *O. Oakesiana.*
Pubescence hirsute or canescent-hirsute; species ranging west of the Rocky Mountains. 5. *O. Hookeri.*
Calyx-tubes stout, 6–13 cm. long
Leaves distantly toothed, minutely ciliate. 6. *O. Jamesii.*
Leaves entire, with short bristle-like cilia. 7. *O. macroceles.*
Plants perennial. 8. *O. arguta.*

1. ONAGRA CRUCIATA (Nutt).

OEnothera cruciata Nutt.; Ser. in DC. Prodr. 3: 47. as synonym. 1828.

OEnothera biennis var. *cruciata* T. & G. Fl. N. A. 1: 492. 1840.
Onagra biennis cruciata Britton, Mem. Torr. Club, 5: 233. 1894.
Vermont and Massachusetts.

2. ONAGRA DEPRESSA (Greene).

OEnothera depressa Greene, Pitt. 2: 216. 1891.
Rocky Mountains of Montana.

3. ONAGRA BIENNIS (L.) Scop.

OEnothera biennis L. Sp. Pl. 346. 1753.
OEnothera muricata L. Syst. Ed. 12, 263. 1767.
OEnothera angustifolia Mill. Dict. Gard. Ed. 8, no. 2. 1768.
OEnothera glabra Mill. Gard. Dict. Ed. 8, no. 3. 1768.
Onagra biennis Scop. Fl. Carn. Ed. 2, 1: 269. 1772.
OEnothera graveolens Gilib. Fl. Lituan. 2: 168. 1781.
Onagra parviflora Moench, Meth. 675. 1794.
Onagra muricata Moench, Meth. 675. 1794.
OEnothera gauroides Hornem. Hort. Hafn. 1: 362. 1813.
OEnothera pubescens Nees in Neuwied, Reise N. A. 2: 435.
Onagra Europaea Spach, Hist. Veg. 4: 359. 1835.
Onagra communis Spach, Hist. Veg. 4: 359. 1835.
Onagra chrysantha Spach, Hist. Veg. 4: 362. 1835.
Onagra vulgaris Spach, Nouv. Ann. Mus. Par. 4: 353. 1835.
OEnothera biennis var. *vulgaris* T. & G. Fl. N. A. 1: 492. 1840.
OEnothera biennis var. *muricata* T. & G. Fl. N. A. 1: 492. 1840.
OEnothera biennis var. *canescens* T. & G. Fl. N. A. 1: 492. 1840.
? *OEnothera Jepsonii* Greene, Fl. Francis. 211. 1891.

Throughout the United States, east of the Rocky Mountains, ranging from sea-level to about 650 meters on various mountains.

The geographic range of *O. biennis* is not as extensive as has been supposed. The species proper ranges westward only to the Mississippi River. In the area from the Mississippi River to the Rocky Mountains it is represented by a closely related form clothed with strigose pubescence; this form might be separated as a variety or even a species. As far as I can learn, it has not been found west of the Rocky Mountains. Prof. Greene described *OEnothera Jepsonii** from California, but later referred it to *O. biennis*,* a doubtful disposition unless the plant is introduced. I have not seen specimens of this form.

---

* Fl. Francis. 211.

3a. ONAGRA BIENNIS GRANDIFLORA (Ait.) Lindl.

OEnothera grandiflora Ait. Hort. Kew. 2: 2. 1789.

OEnothera suaveolens Desf. Tab. 169. 1804.

OEnothera biennis var. *grandiflora* Lindl. Bot. Reg. 19. *pl. 1604.* 1833.

OEnothera Lamarkiana Ser. in DC. Prodr. 3: 47. 1828.

Range the same as the species, more common in the Southeast; introduced in the vicinity of San Francisco according to Prof. Greene.

4. ONAGRA OAKESIANA (A. Gray) Britton.

OEnothera biennis var. *Oakesiana* A. Gray, Man. Ed. 5, 178. 1867.

OEnothera Oakesiana Robbins; A. Gray, Man. Ed. 5, 178. As synonym. 1867.

Onagra Oakesiana Britton, Mem. Torr. Club, 5: 233. 1894.

Shores of the St. Lawrence, west to the Great Lake region, south to New York and Nebraska.

5. ONAGRA HOOKERI (T. & G.).

OEnothera Hookeri T. & G. Fl. N. A. 1: 493. 1840.

OEnothera biennis Torr. Emory Rep. 140. 1848. Not L.

? *OEnothera odorata* H. & A. Bot. Beech. Voy. 343. 1841.

OEnothera biennis var. *hirsutissima* A. Gray, Pl. Fendl. 43. 1848.

Western slopes of the Rocky Mountains, west to the Pacific; at 1800 meters in Utah.

It seems remarkable that this excellent species could be confounded with *O. biennis*. Its gross characters are so strong that a scrap or even a leaf is sufficient to separate it from related species. It does not range east of the Rocky Mountains and is the western homologue of the eastern *O. biennis*.

6. ONAGRA JAMESII (T. & G).

OEnothera Jamesii T. & G. Fl. N. A. 1: 493. 1840.

Southern Utah south to eastern Texas and eastern Arizona.

---

* Man. Bot. Bay Reg. 131.

7. ONAGRA MACROSCELES (A. Gray).

OEnothera macrosceles A. Gray, Pl. Fendl. 43. 1848.

Northern Mexico.

8. ONAGRA ARGUTA (Greene).

OEnothera arguta Greene, Fl. Francis, 212. 1891.

Southern California, from Monterey southward. I have not seen specimens of this plant.

2. OENOTHERA L. Sp. Pl. 340. 1753.

- Flowers axillary.
  - Plants clothed with dense appressed or ascending pubescence.
    - Flowers 2–3 cm. broad; species of the Atlantic Coast. 1. *O. humifusa*
    - Flowers 7–9 cm. broad; species of the Western Gulf Coast. 2. *O. Drummondii.*
  - Plants glabrous or rarely clothed with spreading hairs. 3. *O. laciniata.*
- Flowers in terminal leafy bracted spikes.
  - Spike few-flowered, loose; bracts ovate; calyx villous. 4. *O. heterophylla.*
  - Spike many-flowered, dense; bracts narrow; calyx silky. 5. *O. rhombipetala.*

1. OENOTHERA HUMIFUSA Nutt.

OEnothera humifusa Nutt. Gen. 1: 245. 1818.

OEnothera sinuata var. *humifusa* T. & G. Fl. N. A. 1: 494. 1840.

Drifting sand along the coast from New Jersey to Florida; ranges but little above sea-level.

2. OENOTHERA DRUMMONDII Hook.

OEnothera Drummondii Hook. Bot. Mag. *pl. 3361.* 1835.

? *OEnothera sinuata* var. *humifusa* A. Gray, Proc. Am. Acad. 5: 158. 1862.

Coast of Texas; ranges only a few meters above sea-level.

3. OENOTHERA LACINIATA Hill.

OEnothera laciniata Hill, Syst. Veg. 12: 64. 1767.

OEnothera sinuata L. Mant. 2: 228. 1771.

OEnothera repanda Medic. Act. Acad. Theod. Palat. 3: 198. *pl. 8.* 1775.

Onagra sinuata Moench, Meth. 676. 1794.

OEnothera prostrata Ruiz & Pavon, Fl. Per. 3: 79. *pl. 315.* 1802.

OEnothera minima Pursh, Fl. Am. Sept. 262. *pl. 15.* 1814.

OEnothera sinuata var. *minima* Nutt. Gen. **1**: 245. 1818.

? *OEnothera longiflora* Scheele; S. Wats. Proc. Am. Acad. **8**: 618 1873. Not Jacq.

New Jersey south to Florida, to Texas and Nebraska, also in central and northern South America.

3a. OENOTHERA LACINIATA MEXICANA (Spach).

OEnothera Mexicana Spach, Nouv. Ann. Mus. Par. **4**: 347. 1835.

OEnothera sinuata var *hirsuta* T. & G. Fl. N. A. **1**: 494. 1840.

Nebraska to Texas and Mexico.

3b. OENOTHERA LACINIATA OCCIDENTALIS.

OEnothera sinuata var. *grandiflora* S. Wats. Proc. Am. Acad. **8**: 581. 1873. Not *OE. grandiflora* Ait. 1789.

?*OEnothera longiflora* Scheele; S. Wats. Proc. Am. Acad. **8**: 618. 1873.

Missouri to Kansas, south to Texas.

4. OENOTHERA HETEROPHYLLA Spach.

OEnothera heterophylla Spach, Nouv. Ann. Mus. Par. **4**: 348. 1835.

OEnothera bifrons Don, Sweet, Brit. Fl. Gard. (II.) *pl. 386.* 1831–1838.

OEnothera rhombipetala Engelm. & Gray, Bost. Journ. Nat. Hist **5**: 216. 1847.

OEnothera Leona Buckley, Proc. Acad. Phila. **1861**: 163. 1861.

Florida to Texas.

5. OENOTHERA RHOMBIPETALA Nutt.

OEnothera rhombipetala Nutt.; T. & G. Fl. N. A. **1**: 493. 1840.

OEnothera Darlingtonii Pickering; S. Wats. Proc. Am. Acad. **8**: 612. 1873.

Minnesota and Wisconsin, to Illinois, Nebraska and Indian Territory.

4. ANOGRA Spach, Ann. Sci. Nat. (II.) 4: 164. 1835.

Burmannia Spach, Hist. Veg. **4**: 351. 1835. Not DC. 1833.

Tips of the calyx-segments not free in the bud.
  Capsules divergent or reflexed.
    Valves of the capsules not winged at the base. 1. *A. deltoidea.*
    Valves of the capsules winged at the base. 2. *A. xylocarpa.*

Capsules more or less ascending.
Seeds narrow, smooth, sharply pointed. 3. *A. trichocalyx.*
Seeds ovoid, minutely ribbed and pitted, rather blunt. 4. *A. albicaulis.*
Tips of the calyx-segments free in the bud.
Throat of the calyx-tube villous within. 5. *A. coronopifolia.*
Throat of the calyx-tube glabrous within.
Calyx glabrous or rarely appressed pubescent.
Stem several centimeters long; leaves long-petioled. 6. *A simplex.*
Stem elongated; leaves short-petioled or sessile. 7. *A. pallida.*
Calyx villous.
Lower leaves oblanceolate or spatulate in outline. 8. *A. Californica.*
Lower leaves lanceolate or oblong in outline. 9. *A. Neo-Mexicana.*

1. ANOGRA DELTOIDEA (Torr & Frem.).

OEnothera deltoidea Torr. & Frem., Frem. Rep. 315. 1845.
Utah to California and Arizona.

2. ANOGRA XYLOCARPA (Coville).

OEnothera xylocarpa Coville, Cont. Nat. Herb. 4: 105. 1892.
Tulare County, California.

3. ANOGRA TRICHOCALYX (Nutt.).

OEnothera trichocalyx Nutt; T. & G. Fl. N. A. 1: 494. 1840.
Wyoming to California and New Mexico; ascends to 1950 meters in California.

4. ANOGRA ALBICAULIS (Pursh) Britton.

OEnothera albicaulis Pursh, Fl. Am. Sept. 733. 1814.
OEnothera pinnatifida Nutt. Gen. 1: 245. 1818.
OEnothera Purshiana Steud. Nom. 2: 207. 1841.
OEnothera Purshii Don, Gard. Dict. 2: 688. 1832.
Burmannia pinnatifida Spach, Hist. Veg. 4: 353. 1835.
Anogra pinnatifida Spach, Nouv. Ann. Mus. Par. 4: 341. 1835.
OEnothera coronopifolia A. Gray, Pl. Wright. 2: 56. 1853.
Anogra albicaulis Britton, Mem. Torr. Club, 5: 234. 1894.
South Dakota to the Rocky Mountains south to Indian Territory, New Mexico and Sonora, ascending to 1100 meters in the Black Hills.

5. ANOGRA CORONIPOFOLIA (T. & G.) Britton.

OEnothera coronipofolia T. & G. Fl. N. A. 1: 245. 1840.

OEnothera pinnatifida James, Bot. Long's Exp. 2: 154. 1825. Not Nutt. 1818.

South Dakota to Wyoming, south to Kansas, Utah and New Mexico.

6. ANOGRA SIMPLEX.

OEnothera ambigua S. Wats. Proc. Am. Acad. 14: 293. 1879. Not Spreng, 1825.

OEnothera albicaulis var. *decumbens* S. Wats. Proc. Am. Acad. 14: 293. 1879, as synonym. Not *OE. decumbens* Dougl.

Southern Utah and Northern Arizona.

7. ANOGRA PALLIDA (Lindl.) Britton.

OEnothera albicaulis Nutt. Fras. Cat. Name only. 1813.

OEnothera pallida Lindl. Bot. Reg. 14: *pl. 1142.* 1828.

OEnothera Nuttallii Sweet, Hort. Brit. Ed. 2, 199. 1830.

Baumannia Nuttalliana Spach, Hist. Veg. 4: 352. 1835.

Anogra Nuttalliana Spach, Nouv. Ann. Mus. Par. 4: 339, 1835.

Baumannia Douglasiana Spach, Hist. Veg. 4: 352. 1835.

Anogra Douglasiana Spach, Nouv. Ann. Mus. Par. 4: 339, 1835.

OEnothera pinnatifida var. *integrifolia* A. Gray, Pl. Fendl. 44. 1848.

OEnothera albicaulis var. *Nuttallii* Engelm. Am. Journ. Sci. (II.) 34: 334. 1862.

OEnothera leptophylla Nutt.; S. Wats. Proc. Am. Acad. 8: 602. 1873.

British Columbia to Washington and Minnesota south to Sonora; ascends to about about 1700 meters in the Black Hills.

7a. ANOGRA PALLIDA LATIFOLIA (Rydberg).

OEnothera pallida var. *latifolia* Rydberg, Cont. Nat. Herb. 3: 159. 1895.

Nebraska and Colorado.

7b. ANOGRA PALLIDA RUNCINATA (Engelm.).

OEnothera albicaulis var. *runcinata* Engelm. Am. Journ. Sci. (II.), 34: 334. 1862.

OEnothera pinnatifida A. Gray, Pl. Fendl. 43. In part. 1848. Not Nutt. 1818.

Utah to Arizona and Texas.

7c. ANOGRA PALLIDA BREVIFOLIA (Engelm.).

OEnothera albicaulis var. *brevifolia* Engelm. Am. Journ. Sci. (II.) 34: 335. 1862.

Sand hills south of El Paso, Texas.

7d. ANOGRA PALLIDA ENGELMANNI.

OEnothera albicaulis var. *trichocalyx* Engelm. Am. Journ. Sci. (II.), 34: 335. 1862. Not *O. trichocalyx.* Nutt. 1840.

Las Vegas, New Mexico.

8. ANOGRA CALIFORNICA (S. Wats.).

OEnothera albicaulis var. *Californica* S. Wats. Proc. Am. Acad. 8: 582. 1873.

OEnothera Californica S. Wats. Bot. Calif. 1: 223. 1876.

Central California to southern Utah and southward; ascends to 1900 meters in the San Bernardino Mountains.

9. ANOGRA NEO-MEXICANA n. sp.

OEnothera albicaulis var. A. Gray, Pl. Wright. 2: 56. 1853.

Annual or perennial, stout, hispid-villous, dark green. Stem erect, 6–7 dm. tall, flexuous, somewhat branched, clothed with a pale papery bark; leaves oblong or lanceolate, 4–8 cm. long, obtuse or acute, sinuate-toothed or somewhat pinnatifid, puberulent, with some hispid-villous hairs on the mid-rib and lateral nerves, rather abruptly narrowed into a slender petiole which is less than one centimeter long; flowers few at the ends of the branches, 5–6 cm. broad; calyx hispid-villous, its tube stoutish, 4–4.5 cm. long; nearly thrice longer than the ovary, its segments nearly linear, one-half as long as the tube, the tips free in the bud; petals broadly obdeltoid, 1.8 cm. long, 2 cm. broad, somewhat emarginate, narrowed into a broad claw; filaments about one-half as long as the petals; anthers 1–1.2 cm. long; style slender, longer than the petals; capsule nearly cylindric, 2–2.5 cm. long, somewhat narrowed at the base and the apex, hispid-villous; seeds "oblong and perfectly smooth."

New Mexico. Wright, no. 1068.

A perfectly distinct species, related to *A. pallida,* but easily separated by its foliage and hispid-villous calyx.

4. KNEIFFIA Spach, Hist. Veg. 4: 373. 1835.

Stem-leaves linear-filiform; capsule 4-angled or slightly winged. 1. *K. linifolia.*

Stem-leaves never approaching filiform; capsules winged.

Capsules more or less club-shaped.
Capsules pubescent.
Stems decumbent, spreading; pedicels shorter than the body of the capsules. 2. *K. Alleni.*
Stems erect or nearly so, not spreading.
Pedicels longer than the body of the capsules.
Body of the capsules subglobose; leaves numerous. 3. *K. subglobosa.*
Body of the capsules obovoid, leaves few. 4. *K. longipedicellata.*
Pedicels shorter than the body of the capsules.
Capsules on slender pedicels, with thin wings. 5. *K. linearis.*
Capsules on stout pedicels (sometimes nearly sessile) with thick wings. 6. *K. Spachiana.*
Capsules glabrous or glabrate. 7. *K. pumila.*
Capsules oblong or nearly so.
Plants not glaucous; capsules less than 1 cm. long. 8. *K. fruticosa.*
Plants somewhat glaucous; capsules 1 cm. long. 9. *K. glauca.*

1. KNEIFFIA LINIFOLIA (Nutt.) Spach.

OEnothera linifolia Nutt. Journ. Acad. Phila. 2: 120. 1821.

Kneiffia linifolia Spach, Nouv. Ann. Mus. Par. 4: 368. 1835.

Kansas and Illinois to Texas and Georgia; ascends only a few meters above sea-level.

2. KNEIFFIA ALLENI (Britton).

OEnothera fruticosa var. *humifusa* Allen, Bull. Torr. Club, 1: 3. 1870. Not *OE. humifusa* Nutt. 1818.

Kneiffia linearis Alleni Britton, Mem. Torr. Club, 5: 235. 1894.

Eastern end of Long Island, at sea-level.

This local form must be separated from the species with which it has been associated on account of its habit, flowers and capsule.

3. KNEIFFIA SUBGLOBOSA n. sp.

Perennial, slender, puberulent, dull green, producing numerous stolons. Stem erect, 2–3 dm. tall, much branched, strict or slightly flexuous, red; basal leaves spatulate, 4–10 cm. long, obtuse or acutish, undulately toothed, gradually narrowed into a short petiole; stem leaves linear or nearly so, 2–7 cm. long, entire or distantly toothed, narrowed into a short petiole or sessile, slightly revolute; flowers in terminal racemes which are more or less corymbosely arranged, yellow, about 3 cm. broad; calyx villous or silky, its tube slender, 1 cm. long, about twice as long as the ovary, its segments linear, about as long as the tube and less pubescent, the tips free in the bud; petals obovate, 1.5 cm long, notched at the apex; filaments nearly one half as long as the petals;

style slender, two-thirds as long as the petals; stigmas filiform, 3-4 mm. long; capsule at length subglobose, or globose-obovoid, 6-7 mm. long, on a stalk which exceeds the body, the angles strongly winged, the faces strongly ridged; seeds very irregular, minutely papillose, black, 1 mm. long.

North Carolina and Georgia.

Most closely related to *K. Alleni* and part of Torrey and Gray's var. *β*. It differs especially in its erect habit, very different basal leaves and larger flowers.

4. KNEIFFIA LONGIPEDICELLATA n. sp.

Annual, slender, bright green, more or less puberulent, stem erect or assurgent, 4-7 dm. tall, red, slender, simple or sparingly branched above; basal-leaves spatulate or obovate-spatulate, 4-6 cm. long; stem-leaves few, linear-lanceolate, 3-9 cm. long, obtuse or acutish, entire, often somewhat undulate, narrowed into a short petiole; flowers yellow, subtended by leaf-like bracts in terminal racemes which are sometimes corymbosely arranged; calyx hirsute, its tube slender, 1-1.5 cm. long, its segments linear, longer than the tube, the tips free in the bud; petals obovate, 2 cm. long, many-nerved, emarginate, stamens less than one half as long as the petals; styles slender, two-thirds as long as the petals; capsule narrowly obovoid, 1 cm. long, its angles winged, its faces ridged, on pedicels longer than the body; seeds irregularly oblong, .8 mm. long, brown, minutely papillose.

West Virginia to North Carolina and Florida.

Between *K. subglobosa* and *K. linearis*. It differs from the former in its sparsely leafy, usually nearly simple stem, the hirsute calyx, the larger flowers and the narrowly obovoid capsules. It can easily be separated from *K. linearis* by its pedicel, which exceeds the body of the capsule.

5. KNEIFFIA LINEARIS (Michx.) Spach.

OEnothera linearis Michx. Fl. Bor. Am. 1: 225. 1803.

?OEnothera media Link, Enum. Hort. Berol. 1: 377. 1821. acc. to S. Wats.

OEnothera riparia Nutt. Gen. 1: 247. 1818.

?OEnagra Linkiana Spach, Nouv. Ann. Mus. Par. 4: 354. 1835.

OEnothera fruticosa var. *linearifolia* Hook. Bot. Mag. *pl. 3545*. 1837.

Kneiffia linearis Spach, Hist. Veg. 4: 376. 1835.

Kneiffiia angustifolia Spach, Nouv. Ann. Mus. Par. 4: 368. 1835.

?Kneiffiia maculata Spach, Hist. Veg. 4: 375. 1835.

OEnothera fruticosa var. *linearis* S. Wats. Proc. Am. Acad. 8: 584. 1873.

Connecticut to Tennessee, south to Georgia.

6. KNEIFFIA SPACHIANA (T. & G.).

OEnothera Spachiana T. & G. Fl. N. A. 1: 498. 1840.

Blennoderma Drummondii Spach, Nouv. Ann. Mus. Par. 4: 408. 1835.

OEnothera Drummondii Walp. Rep. 2: 85. 1843. Not Hook.

OEnothera uncinata Scheele, Linnaea, 21: 578. 1848.

Texas and Louisiana; ascends only a few feet above sea-level.

7. KNEIFFIA PUMILA (L.) Spach.

OEnothera pumila L. Sp. Pl. Ed. 2, 493. 1762.

OEnothera pusilla Michx. Fl. Bor. Am. 1: 225. 1803.

OEnothera chrysantha Michx. Fl. Bor. Am. 1: 225. 1803.

OEnothera gracilis Schrad.; F. & M. Ind. Sem. Hort. Petrop. 2: 44. 1835.

OEnothera riparia Lehm.; Hook. Fl. Bor. Am. 1: 212. 1830, not Nutt.

Kneiffia pumila Spach, Hist. Veg. 4: 377. 1835.

Kneiffia chrysantha Spach, Hist. Veg. 4: 377. 1835.

Nova Scotia to the Saskatchewan south to Georgia.

8. KNEIFFIA FRUTICOSA (L.) Raimann.

OEnothera fruticosa L. Sp. Pl. 346. 1753.

OEnothera mollissima Walt. Fl. Car. 129. 1788.

OEnothera hybrida Michx. Fl. Bor. Am. 1: 225. 1803.

OEnothera tetragona Roth, Cat. Bot. 2: 39. 1825.

OEnothera Canadensis Goldie, Edinb. Phil. Journ. 6: 325. 1822.

OEnothera incana Nutt. Gen. 1: 247. 1818.

OEnothera serotina Don; Sweet, Brit. Fl. Gard. 2: *pl. 184* 1825–1827.

Kneiffia suffruticosa Spach, Nouv. Ann. Mus. Par. 4: 365. 1835.

OEnothera fruticosa var. *differta* Millsp. Fl. W. Va. 366. 1892.

Kneiffia fruticosa Raimann, in Engl. & Prantl. Nat. Pfl. Fam. 3: Abt. 7, 214. 1893.

Nova Scotia to Missouri and southward.

8a. KNEIFFIA FRUTICOSA PILOSELLA (Raf.) Britton.

OEnothera Pilosella Raf. Ann. Nat. 15. 1820.

? *OEnothera fruticosa* var. *ambigua* Nutt. Gen. 1: 247. 1818.

? *OEnothera ambigua* Spreng. Syst. 2: 229. 1825.

Kneiffia floribunda Spach, Nouv. Ann. Mus. Par. 4: 366. 1835.

OEnothera fruticosa var. *hirsuta* Nutt.; T. & G. Fl. N. A. 1: 496. 1840.

Kneiffia fruticosa Pilosella Britton, Mem. Torr. Club, 5: 234. 1894.

9. KNEIFFIA GLAUCA (Michx.) Spach.

OEnothera glauca Michx. Fl. Bor. Am. 1: 224. 1803.

Kneiffia glauca Spach, Hist. Veg. 4: 374. 1835

OEnothara Fraseri Pursh, Fl. Am. Sept. 734. 1814.

OEnothera glauca var. *Fraseri* T. & G. Fl. N. A. 1: 497. 1840.

OEnothera fruticosa var. *Fraseri* Hook. Bot. Mag. *pl. 3548.* 1837.

Kneiffia Fraseri Spach, Hist. Veg. 4: 375. 1835.

Virginia and Kentucky, south to Georgia and Alabama, ascends to 1600 meters on Roan. Mt., Tenn.

5. HARTMANNIA Spach, Hist. Veg. 4: 370. 1835.

[XYLOPLEURUM Spach, Hist. Veg. 4: 378. 1835.]

Plants canescent (except some forms of *H. rosea parviflora*).
  Calyx-tube shorter than the ovary; capsule club-shaped. 1. *H. rosea.*
  Calyx-tube longer than the ovary; capsule oblong or elliptic. 2. *H. speciosa.*
Plants more or less villous. 3. *H. tetraptera.*

1. HARTMANNIA ROSEA (Ait.) Don.

OEnothera rosea Ait. Hort. Kew. 2: 3. 1789.

OEnothera rubra Cav. Ic. 4: 68. *pl. 400.* 1797.

OEnothera purpurea Lam. Encycl. 4: 554. 1797.

Hartmannia rosea Don, in Sweet, Hort. Brit. Ed. 3, 236. 1.839.

Hartmannia gauroides Spach, Hist. Veg. 4: 371. 1835.

Xylopleurum roseum Raimann, in Engl. & Prantl, Nat. Pfl. Fam. 3: Abt. 7, 214. 1893.

Texas to New Mexico and southward; also in western South America.

1a. HARTMANNIA ROSEA PARVIFOLIA (Coult.).

OEnothera rosea var. *parvifolia* Coult. Cont. Nat. Herb. **2**: 186. 1891.

Texas and northern Mexico.

2. HARTMANNIA SPECIOSA (Nutt.).

OEnothera speciosa Nutt. Journ. Acad. Phila. **2**: 119. 1821.

Xylopleurum hirsutum Spach, Nouv. Ann. Mus. Par. **4**: 370. 1835.

Xylopleurum Nuttallii Spach, Nouv. Ann. Mus. Par. **4**: 371. 1835.

Xylopleurum Drummondii Spach, Nouv. Ann. Mus. Par. **4**: 371. 1835.

Xylopleurum obtusifolium Spach, Nouv. Ann. Mus. Par. **4**: 372. 1835.

OEnothera Spachii Dietr. Syn. **2**: 1289. 1840.

OEnothera obtusifolia Dietr. Syn. **2**: 1289. 1840.

OEnothera Drummondii Schnitzlein, Ic. *pl. 265. f. 1.*

Xylopleurum speciosum Raimann, in Eng. & Prantl, Nat. Pfl. Fam. **3**: Abt. 7, 214. 1893.

Missouri to Kansas, south to Texas and Mexico; introduced into fields around Charleston, S. C.

3. HARTMANNIA TETRAPTERA (Cav.).

OEnothera tetraptera Cav. Ic. **3**: 40. *pl. 279.* 1794.

Texas, Mexico, Central America and northern South America.

6. PACHYLOPHUS Spach, Hist. Veg. 4: 365. 1835.

PACHYLOPHUS CAESPITOSA (Nutt.) Raimann.

OEnothera caespitosa Nutt. Fras. Cat. 1813.

OEnothera scapigera Pursh, Fl. Am. Sept. 263. 1814.

Pachylophus Nuttallii Spach, Hist. Veg. **4**: 365. 1835.

Pachylophus Nuttalliana Spach, Nouv. Ann. Mus. Par. **4**: 356. 1835.

OEnothera montana Nutt.; T. & G. Fl. N. A. **1**: 500. 1840.

OEnothera marginata Nutt.; Hook. & Arn. Bot. Beech. 342. 1841.

OEnothera eximia A. Gray, Pl. Fendl. 45. 1848.

Pachylophis caespitosa Raimann, in Eng. & Prantl, Nat. Pfl. Fam. 3: Abt. 7, 215. 1893.

Dakota to Idaho, south to California, New Mexico and Senora.

7. LAVAUXIA Spach, Hist. Veg. 4: 366. 1835.

Tips of the calyx-segments not free in the bud. 1. *L. primiveris.*
Tips of the calyx-segments free in the bud.
  Leaves thinnish, very conspicuously pinnatifid. 2. *L. triloba.*
  Leaves thick, entire or sparingly pinnatifid near the base.
    Capsule ovoid or elliptic; testa of the seed thickened. 3. *L. brachycarpa.*
    Capsule attenuate at the apex; testa of the seed not thickened. 4. *L. Wrightii.*

1. LAVAUXIA PRIMIVERIS (A. Gray).

OEnothera primiveris A. Gray, Pl. Wright. 2: 58. 1853.

Texas and New Mexico.

2. LAVAUXIA TRILOBA (Nutt.) Spach.

OEnothera triloba Nutt. Journ. Acad. Phila. 2: 118. 1821.

OEnothera rhizocarpa Spreng. Syst. 2: 239. 1825.

Lavauxia triloba Spach, Hist. Veg. 4: 367. 1835.

Lavauxia Nuttalliana Spach, Nouv. Ann. Mus. Par. 4: 358. 1835.

OEnothera Roemeriana Scheele, Linnaea, 22: 154. 1849.

OEnothera clandestina Nutt.; S. Wats. Proc. Am. Acad. 8: 615. 1873.

Saskatchewan to Texas, California and Sonora.

2a. LAVAUXIA TRILOBA WATSONI Britton.

OEnothera triloba (?) var. *parviflora* S. Wats. Proc. Am. Acad. 12: 251. 1876. Not *O. parviflora* L.

Lavauxia triloba Watsoni Britton, Mem. Torr. Club, 5: 235. 1894.

Kansas and Nebraska.

3. LAVAUXIA BRACHYCARPA (A. Gray) Britton.

OEnothera brachycarpa A. Gray, Pl. Wright. 1: 70. 1852.

OEnothera marginata var. *purpurea* S. Wats. Bot. King's Rep. 5: 108. 1871.

Lavauxia brachycarpa Britton, Mem. Torr. Club, 5: 235. 1894.

Western Texas and New Mexico, probably in Nevada and Montana.

4. Lavauxia Wrightii (A. Gray).

OEnothera Wrightii A. Gray, Pl. Wright. 2: 57. 1853.

New Mexico.

8. GAURELLA.

Perennial herbs low, wiry, diffuse, canescent or strigilose. Stems at length branched throughout and spreading, leafy, clothed with a longitudinally wrinkled bark; leaves small, linear-lanceolate or lanceolate, nearly entire or distantly toothed, narrowed into a very short petiole; flowers axillary, white or rose-colored, spotted or striped with red; calyx purplish, its tube cylindric, slightly dilated at the throat, twice as long as the ovary, its segments slightly longer than the tube; their tips not free in the bud; petals obovate, truncate or emarginate; filaments filiform-subulate; anthers linear; ovary sessile, 4-angled; style stoutish, enlarged at the top; stigmas filiform; capsule ovoid-pyramidal, sessile, attenuate into a slender curved beak, the angles keeled, the faces swollen; seeds obovoid, angled, pointed at the base; delicately striate.

A perfectly distinct genus, with no very close affinity to related groups. It differs from *Megapterium*, with which it has been associated, in habit, foliage, inflorescence and fruit.

1. Gaurella guttulata (Geyer).

OEnothera canescens Torr. & Frem., Frem. Rep. 315. 1845. Not *OE. biennis* var. *canescens* T. & G. 1840.

OEnothera guttulata Geyer; Hook. Lond. Journ. Bot. 6: 222. 1847.

Megapterium canescens Britton, Mem. Torr. Club, 5: 235. 1894.

Wyoming to Kansas and New Mexico.

9. MEGAPTERIUM Spach, Hist. Veg. 4: 363. 1835.

Leaves entire or nearly so.	
Capsule (with wings) oblong, 2–3 cm. long.	1. *M. Fremontii.*
Capsule (with wings) suborbicular, 5–6 cm. long.	2. *M. Missouriense.*
Leaves pinnatifid.	3. *M. dissectum.*

1. Megapterium Fremontii (S. Wats.) Britton.

OEnothera Fremontii S. Wats. Proc. Am. Acad. 8: 587. 1873.

Megapterium Fremontii Britton, Mem. Torr. Club, 5: 286. 1893.

Kansas to Texas.

2. MEGAPTERIUM MISSOURIENSE (Sims) Spach.

OEnothera Missouriensis Sims, Bot. Mag. *pl. 1592.* 1814.

OEnothera macroparpa Pursh, Fl. Am. Sept. 374. 1814.

OEnothera alata Nutt. Gen. 1: 248. 1818.

Megapterium Missouriense Spach, Hist. Veg. 4: 364. 1835.

Megapterium Nuttallianum Spach, Hist. Veg. 4: 363. 1835.

OEnothera Drummondii Hook. Lond. Journ. Bot. 6: 221. 1847.

OEnothera Missouriensis var. *latifolia* A. Gray, Bost. Journ. Nat. Hist. 5: 188. 1856.

OEnothera Missouriensis var. *incana* A. Gray, Bost. Journ. Nat. Hist. 5: 189. 1856.

Nebraska to Texas.

3. MEGAPTERIUM DISSECTUM (A. Gray).

OEnothera dissecta A. Gray, Proc. Am. Acad. 17: 356. 1882.

OEnothera Havardi S. Wats. Proc. Am. Acad. 20: 366. 1885.

Western Texas and northern Mexico.

10. TARAXIA Nutt.; Raimann in Engl. and Prantl, Nat. Pfl. Fam. 3: Abt. 7, 216. 1893.

Leaves not pinnatifid.
- **Plants hirsute.**
  - **Plants acaulescent.** 1. *T. graciliflora.*
  - **Plants producing several short branches.** 2. *T. Palmeri.*
- **Plants glabrous or glabrate; leaves lanceolate or linear.**
  - **Leaves lanceolate; calyx-segments linear-lanceolate.** 3. *T. heteranthera.*
  - **Leaves ovate; calyx-segments lanceolate.** 4. *T. ovata.*

Leaves pinnatifid.
- **Sparingly pubescent; calyx-tube longer than the segments; seeds minutely pitted in rows.** 5. *T. breviflora.*
- **Densely pubescent; calyx-tube several times longer than the segments; seeds conspicuously pitted.** 6. *T. longiflora.*

1. TARAXIA GRACILIFLORA (H. & A.) Raimann.

OEnothera graciliflora H. & A. Bot. Beech. Voy. 341. 1841.

Taraxia graciliflora Raimann, in Engl. & Prantl, Nat. Pfl. Fam. 3: abt. 7, 217. 1893.

California except the extreme north; apparently also in Colorado.

2. TARAXIA PALMERI (S. Wats.).

OEnothera Palmeri S. Wats. Proc. Am. Acad. 12: 251. 1877.

Valleys, Arizona and southern California.

3. TARAXIA HETERANTHA (Nutt.).

OEnothera heterantha Nutt. Journ. Acad. Phila. 7: 22. 1834.

Jussiaea subacaulis Pursh, Fl. Am. Sept. 304. 1814.

OEnothera triloba Hook. Lond. Journ. Bot. 6: 223. 1847. Not Nutt. 1821.

Idaho and Oregon to Utah and Nevada; at about 2200 meters in Utah.

3a. TARAXIA HETERANTHA TARAXACIFOLIA (S. Wats.).

OEnothera heterantha var. *taraxacifolia* S. Wats. Proc. Am. Acad. 8: 589. 1873.

On the Sierra Nevada.

4. TARAXIA OVATA (Nutt.).

OEnothera ovata Nutt.; T. & G. Fl. N. A. 1: 507. 1840.

California from San Francisco to Monterey.

5. TARAXIA BREVIFLORA (T. & G.) Nutt.

OEnothera breviflora T. & G. Fl. N. A. 1: 506. 1840.

OEnothera Nuttallii Torr. & Frem., Frem. Rep. 89. 1845.

Taraxia breviflora Nutt.; T. & G. Fl. N. A. 1: 506. 1840.

Northwest Territory to Colorado and Utah, where it ascends to about 2800 meters.

6. TARAXIA LONGIFLORA Nutt.

OEnothera Nuttallii T. & G. Fl. N. A. 1: 506. 1840. Not Sweet. 1830.

OEnothera tanacetifolia T. & G. Pacif. R. R. Rep. 2: 121. *pl. 4,* 1854.

Taraxia longiflora Nutt.; T. & G. Fl. N. A. 1: 506. As synonym. 1840.

Washington to Nevada and California.

11. GALPINSIA Britton, Mem. Torr. Club, 5: 263. 1894.

[SALPINGIA Raimann in Engl. & Prantl, Nat. Pfl. Fam. 3: Abt. 7, 217. 1893. Not *Salpinga* DC.]

Free tips of the calyx-segments about 3 mm. long.	**1. *G. Hartwegii.***
Free tips of the calyx-segments less than 2 mm. long.	
Plants hispid; calyx-tube much longer than the ovary.	**2. *G. Greggii.***
Plants puberulent; calyx-tube slightly longer than the ovary.	**3. *G. tubicula.***

1. Galpinsia Hartwegi (Benth.) Britton.

OEnothera Hartwegi Benth. Pl. Hartw. 5. 1839.

OEnothera lavandulaefolia T & G. Fl. N. A. 1: 501. 1840.

OEnothera Hartwegi var. *lavandulaefolia* S. Wats. Proc. Am. Acad. 8: 590. 1873.

Salpingia Hartwegi Raimann, in Engl. & Prantl, Nat. Pfl. Fam. 3: Abt. 7, 217. 1893.

Galpinsia Hartwegi Britton, Mem. Torr. Club, 5: 236. 1894.

Kansas to Colorado and Mexico.

1*a*. Galpinsia Hartwegi Fendleri (A. Gray).

OEnothera Fendleri A. Gray, Pl. Fendl. 45. 1848.

OEnothera Hartwegi var. *Fendleri* A. Gray, Pl. Wright. 2: 56. 1853.

Nebraska to Indian Territory, Texas and New Mexico.

2. Galpinsia Greggii (A. Gray).

OEnothera Greggii A. Gray, Pl. Fendl. 46. 1848.

OEnothera Lampsana Buckl. Proc. Acad. Phila. 1861: 454. 1861.

OEnothera Hartwegi var. A. Gray, Proc. Acad. Phila. 1862: 163. 1862.

New Mexico and northern Mexico.

3. Galpinsia tubicula (A. Gray).

OEnothera tubicula A. Gray, Pl. Wright. 1: 71. 1852.

OEnothera tubicula var. *demissa* A. Gray, Pl. Wright. 1: 71, 1852.

Northwestern Texas and New Mexico.

12. MERIOLIX Raf. Am. Month. Mag. 4: 192. 1881.

[Calylophis Spach, Hist. Veg. 4: 350. 1835.]

1. Meriolix serrulata (Nutt.) Walp.

OEnothera serrulata Nutt. Gen. 1: 246. 1818.

Calylophis Nuttallii Spach, Hist. Veg. 4: 350, 1835.

OEnothera fruticosa A. Gray, Pl. Fendl. 44. 1848.

OEnothera leucocarpa Comien; Lehm. in Hook. Fl. Bor. Am. 1: 210. 1833.

OEnothera serrulata var. *Douglassi* T. & G. Fl. Bor. Am. 1: 502. 1840.

OEnothera serrulata var. *Drummondii* T. & G. Fl. N. A. 1: 502. 1840.

Calylophis Drummondiana Spach, Nouv. Ann. Mus. Par. 4: 337. 1835.

? *Calylophis Berlandieri* Spach, Nouv. Ann. Mus. Par. 4: 337. 1835.

Meriolix serrulata Walp. Repert. 2: 79. 1843.

Meriolix Berlandieri Walp. Repert. 2: 79. 1843.

OEnothera spinulosa var. *Drummondii* Engelm. Pl. Upp. Miss. 192. Acc. to S. Wats.

Saskatchewan to Missouri, Texas and Arizona.

1a. MERIOLIX SERRULATA SPINULOSA (T. & G.).

OEnothera serrulata Nutt. Journ. Acad. Phila. 2: 120. 1821.

OEnothera serrulata var. *spinulosa* T. & G. Fl. N. A. 1: 502. 1840.

Saskatchewan to Missouri and Texas.

1b. MERIOLIX SERRULATA PINIFOLIA (Engelm.).

OEnothera serrulata var. *pinifolia* Engelm. Bost. Jour. Nat. Hist. 5: 189. 1856.

? *OEnothera capillifolia* Scheele, Linnaea, 21: 576. 1848.

Texas.

13. EULOBUS Nutt.; T. & G. Fl. N. A. 1: 514. 1840.

1. EULOBUS CALIFORNICUS Nutt.; T. & G. Fl. N. A. 1: 515. 1840.

Eulobus Californicus Nutt.; T. & G. Fl. N. A. 1: 515. 1840.

OEnothera Californica Greene, Pitt. 1: 290. 1889, not S. Wats. 1876.

OEnothera leptocarpa Greene, Pitt. 1: 302. 1889.

Southern California.

14. SPHAEROSTIGMA F. & M. Ind. Sem. Hort. Petrop. 2: 49. 1835.

[CHAMISSONIA Link, Jahrb. der Gewächsk. 186. 1818. Not *Chamissoa* H. B. K.]

[AGASSIZIA Spach, Hist. Veg. 4: 346. 1835.]

[HOLOSTIGMA Spach, Nouv. Ann. Mus. Per. 4: 21. 1835.]

- Flowers yellow, turning red or green.
  - Capsules fusiform, straight.
    - Seeds cylindric-oblong. 1. *S. aldinum.*
    - Seeds clavate. 2. *S. Hilgardi.*
  - Capsules linear, somewhat curved.
    - Plants puberulent or hirsute.
      - Capsules scarcely beaked. 3. *S. contortum.*
      - Capsules with a slender beak. 4. *S. campestre.*
    - Plants viscid-glandular. 5. *S. chamaenerioides.*
  - Capsules linear or linear-fusiform, more or less contorted.
    - Flowers less than 1 cm. broad.
      - Lower stem-leaves linear or nearly so; species maritime. 6. *S. micranthum.*
      - Lower stem-leaves ovate; species not maritime. 7. *S. hirtellum.*
    - Flowers more than 1 cm. broad.
      - Plant glabrous and lustrous. 8. *S. nitidum.*
      - Plants pubescent and dull.
        - Stems woody; leaves sessile. 9. *S. viridescens.*
        - Stems herbaceous; lower stem-leaves petioled.
          - Calyx canescent. 10. *S. spirale.*
          - Calyx hirsute.
            - Capsule with a very short beak. 11. *S. Bistorta.*
            - Capsule with a long slender beak. 12. *S. Veitchianum.*
- Flowers white or rose-colored; capsules terete or nearly so.
  - Plants glabrous (inflorescence glabrate); capsules enlarged at the base. 13. *S. decorticans*
  - Plants pubescent or glandular.
    - Capsules enlarged at the base, viscid-glandular. 14. *S. Boothii.*
    - Capsules scarcely enlarged at the base.
      - Plants more or less villous. 15. *S. Utahense.*
      - Plants more or less puberulent.
        - Leaves linear or nearly so. 16. *S. refractum.*
        - Leaves spatulate, elliptic or lanceolate. 17. *S. alyssoides.*

1. SPHAEROSTIGMA ANDINUM (Nutt.) Walp.

OEnothera andina Nutt.; T. & G. Fl. N. A. 1: 512. 1840.

Sphaerostigma andinum Walp. Repert. 2: 79. 1843.

Washington to Montana, south to Nevada and Utah; at 1800 meters in Utah and Nevada.

2. SPHAEROSTIGMA HILGARDI (Greene).

OEnothera Hilgardi Greene, Bull. Torr. Club, 10: 41. 1883.

Washington and Oregon.

3. SPHAEROSTIGMA CONTORTUM (Dougl.) Walp.

OEnothera contorta Dougl.; Lehm. in Hook. Fl. Bor. Am. **1**: 214. 1833.

OEnothera strigulosa T. & G. Fl. N. A. **1**: 512. 1840.

OEnothera parvula Nutt.; T. & G. Fl. N. A. **1**: 511. 1840.

Sphaerostigma contortum Walp. Repert. **2**: 78. 1843.

Sphaerostigma parvulum Walp. Repert. **2**: 78. 1843.

Sphaerostigma strigulosum F. & M. Ind. Sem. Hort. Petrop. **2**: 22. 1835.

Washington to Nevada, Arizona and southern California, where it ascends to 1850 meters.

3a. SPHAEROSTIGMA CONTORTUM PUBENS (S. Wats.).

OEnothera strigulosa var. *pubens* S. Wats. Proc. Am. Acad. **8**: 594. 1873.

OEnothera contorta pubens Coville, Cont. Nat. Herb. **4**: 104. 1893.

Vancouver Island to Nevada, Arizona and Southern California, ascends to 1500–1700 metres in Nevada and California.

3b. SPHAEROSTIGMA CONTORTUM GREENEI.

OEnothera strigulosa var. *epilobioides* Greene, Fl. Francis, 216. 1891. Not *OE. epilobioides* Nutt. 1840.

Away from the seaboard, from Oregon to San Diego, Cal.

4. SPHAEROSTIGMA CAMPESTRE (Greene).

OEnothera dentata S. Wats. Bot. Calif. **1**: 226. 1876. Not Cav. Ic. **4**: 67. *pl.* 398. 1797.

OEnothera campestris Greene, Fl. Francis, 216. 1891.

From the Valley of the Sacramento to southern California, where it ascends to 1700 meters.

4a. SPHAEROSTIGMA CAMPESTRE MINOR.

OEnothera strigulosa Benth. Pl. Hartw. 310. 1849.

OEnothera dentata var. *cruciata* S. Wats. Proc. Am. Acad. **8**: 594. 1873. Not *OE. cruciata* Nutt. 1828.

5. SPHAEROSTIGMA CHAMAENERIOIDES (A. Gray).

OEnothera chamaenerioides A. Gray, Pl. Wright **2**: 58. 1853.

Southern Utah to Texas and southern California.

6. SPHAEROSTIGMA MICRANTHUM (Hornem.) Walp.

OEnothera micrantha Hornem. "Hort. Hafn." 1807.

OEnothera dentata Ser. in DC. Prodr. 3: 46. In part. 1821, not Cav.

OEnothera hirta Link, Enum. 1: 378. 1821.

Sphaerostigma hirta F. & M. Ind. Sem. Hort. Petrop. 2: 22. 1835.

Holostigma micrantha Spach, Nouv. Ann. Mus. Par. 4: 334. 1835.

Sphaerostigma micranthum Walp. Repert. 2: 77. 1843.

OEnothera asperifolia Nutt.; S. Wats. Proc. Am. Acad. 8: 680. 1873.

OEnothera cheiranthifolia Torr. Pacif. R. R. Rep. 4: 87. 1857.

OEnothera strigulosa Torr. Pacif. R. R. Rep. 4: 87. 1857.

OEnothera bistorta A. Gray, Proc. Bost. Soc. Nat. Hist. 7: 146. 1859.

From the valley of the Sacramento south to Lower California,

7. SPHAEROSTIGMA HIRTELLUM (Greene).

OEnothera hirtella Greene, Fl. Francis. 215. 1891.

Mountains, from Lake county, California, southward.

8. SPHAEROSTIGMA NITIDUM (Greene).

OEnothera nitida Greene, Pitt. 1: 70. 1887.

Vicinity of Monterey Bay, California and on the Island of San Miguel.

9. SPHAEROSTIGMA VIRIDESCENS (Lehm.) Walp.

OEnothera viridescens Lehm. in Hook. Fl. Bor. Am. 1: 214. 1833.

Sphaerostigma viridescens Walp. Repert 2: 77. 1843.

Along the coast from Monterey Bay to San Diego.

10. SPHAEROSTIGMA SPIRALE (Lehm.) Walp.

OEnothera spiralis Lehm. in Hook. Fl. Bor. Am. 1: 213. 1833.

Along or near the coast from San Francisco southward.

11. SPHAEROSTIGMA BISTORTA (Nutt.) Walp.

OEnothera bistorta Nutt.; T. & G. Fl. N. A. 1: 508. 1840.

?*Holostigma Bottae* Spach, Nouv. Ann. Mus. Par. 4: 335. 1835.

Sphaerostigma bistortum Walp. Repert. 2: 77. 1843.
OEnothera cheiranthifolia A. Gray. Ives, Rep. 12. 18.
Southern California.

12. SPHAEROSTIGMA VEITCHIANUM (Hook).

OEnothera bistorta (?) var. *Veitchiana* Hook. Bot. Mag. *pl. 5078.*
OEnothera graciliflora Torr. Pacif. R. R. Rep. 4: 87. 1857.
Southern California to Lower California.

13. SPHAEROSTIGMA DECORTICANS (H. & A.).

Gaura decorticans H. & A. Bot. Beech. Voy. 343. 1840.
OEnothera gauraeflora T. & G. Fl. N. A. 1: 510. 1840.
Sphaerostigma gauraeflorum Walp. Repert. 2: 78. 1843.
OEnothera Nevadensis Kellogg, Proc. Calif. Acad. 2: 224. *pl. 70.* 1863.
Southern Utah to Arizona and California; ascends to 2100 meters in California.

14. SPHAEROSTIGMA BOOTHII (Dougl.) Walp.

OEnothera Boothii Dougl.; Lehm. in Hook. Fl. Bor. Am. 1: 213. 1833.
OEnothera pygmaea Dougl.; Lehm. in Hook. Fl. Bor. Am. 1: 213. 1833.
OEnothera lithospermoides Nutt.; S. Wats. Proc. Am. Acad. **8**: 604. 1873.
Sphaerostigma Boothii Walp. Repert. 2: 77. 1843.
Washington to California and Nevada; occurs at about 1000–1100 meters in Nevada.

15. SPHAEROSTIGMA UTAHENSE n. sp.

Annual, low, pale-green, villous. Stem erect, 2–10 cm. tall, simple or branched at the base or above, the branches ascending; leaves varying from spatulate to ovate, 1–2.5 cm. long, densely villous, obtuse or acutish, entire or obscurely toothed, narrowed into slender petioles; flowers yellow, 8–12 mm. broad, in loose terminal spikes; buds ovoid, 5 mm. long; calyx-tube very slender, 7–9 mm. long, shorter than the ovary, abruptly dilated at the throat; calyx-segments ovate or lanceolate, nearly twice shorter than the tube, involute, acutish; petals obovate, 3–5 mm. long, delicately nerved, crisped at the apex; style slender, exceeding the stamens; capsules nearly filiform, about 1.5 cm. long, villous, spirally twisted near the base, slightly glandular; seeds oblong, 13 mm. long, pale, very minutely striate.

A species of low habit, related to *S. gauraeflorum*, *S. Boothii* and *S. refractum*, striking on account of its dense villous pubescence.

Specimens were collected on May 3, 1850, by Capt. Stansbury, at "Great Salt Lake, growing in loose sand on the 'storm line' of the shore," and by M. E. Jones, in June, 1880; these were distributed as *OEnothera Boothii* Dougl.

16. SPHAEROSTIGMA REFRACTUM (S. Wats.).

OEnothera refracta S. Wats. Proc. Am. Acad. 17: 373. 1882.

Southern Utah and northern Arizona.

17. SPHAEROSTIGMA ALYSSOIDES (H. & A.) Walp.

OEnothera alyssoides H. & A. Bot. Beech. Voy. 340. 1840.

Sphaerostigma alyssoides Walp. Repert. 2: 78. 1843.

Idaho and Oregon, south to Nevada, Utah and southern California; at 1100 meters in Nevada and California.

17a. SPHAEROSTIGMA ALYSSOIDES MINUTIFLORUM (S. Wats.).

OEnothera alyssoides var. *minutiflora* S. Wats. Proc. Am. Acad. 8: 591. 1873.

Northern Nevada and Utah.

17b. SPHAEROSTIGMA ALYSSOIDES MACROPHYLLA.

OEnothera alyssoides var. *villosa* S. Wats. Proc. Am. Acad. 8: 591. 1873. Not *OE. villosa* Thunb. 1794–1800.

Nevada and Utah.

OEnothera rutila Davidson, is said to belong to the genus SPHAEROSTIGMA, but I have not seen specimens.

15. CHYLISMA Nutt.; Raimann in Engl. & Prantl, Nat. Pfl. Fam. 3: Abt. 7, 217. 1893.

Flowers axillary, subtended by leaves. 1. *C. pterosperma.*
Flowers in terminal racemes, usually subtended by bracts.
  Plants caulescent.
    Leaves simple.
      Leaves cordate; capsules short-pedicelled. 2. *C. cardiophylla.*
      Leaves narrowed at the base; capsules long-pedicelled.

Plants villous; blade of leaf closely toothed. 3. *C. heterochroma.*
Plants hirsute; blade of leaf distantly toothed. 4. *C. Parryi.*
Leaves compound. 5. *C. multijuga.*
Plants scapose.
Tips of the calyx-segments not free. 6. *C. scapoidea.*
Tips of the calyx-segments free. 7. *C. brevipes.*

1. CHYLISMA PTEROSPERMA (S. Wats.).

OEnothera pterosperma S. Wats. Bot. King, Rep. **5**: 112. *pl. 14.* 1871.

Northwestern Nevada and Utah; occurs at about 1280 meters in Nevada.

2. CHYLISMA CARDIOPHYLLA (Torr.).

OEnothera cardiophylla Torr. Pacif. R. R. Rep. **5**: 360. 1856.

Southern California to Arizona and Lower California; ascends to 700 meters in California.

3. CHYLISMA HETEROCHROMA (S. Wats.).

OEnothera heterochroma S. Wats. Proc. Am. Acad. **17**: 373. 1882.

Western Nevada.

4. CHYLISMA PARRYI (S. Wats.).

OEnothera Parryi S. Wats. Parry, Am. Nat. **9**: 20. 1877.

Southern Utah and northern Arizona.

5. CHYLISMA MULTIJUGA (S. Wats.).

OEnothera multijuga S. Wats. Proc. Am. Acad. **8**: 595. 1873.

Southern Utah.

6. CHYLISMA SCAPOIDEA (Nutt.).

OEnothera scapoidea Nutt.; T. & G. Fl. N. A. **1**: 506. 1840.

Wyoming and Idaho to Utah and southern California; occurs at about 1280 meters in Utah.

6a. CHYLISMA SCAPOIDEA CRUCIFORMIS (Kellogg).

OEnothera clavaeformis T. & G. Pacif. R. R. Rep. **2**: 121. 1856.

OEnothera cruciformis Kellogg, Proc. Cal. Acad. **2**: 227. 1863.

OEnothera scapoidea var. *clavaeformis* S. Wats. Bot. King's Rep. **5**: 109. 1871.

OEnothera scapoidea var. *purpurascens* S. Wats. Proc. Am. Acad. **8**: 595. 1873.

Eastern slope of the Sierra from Oregon to Nevada and southern California; at 400 meters in California.

6b. CHYLISMA SCAPOIDEA CLAVAEFORMIS (Torr.).

OEnothera clavaeformis Torr. Frem. Rep. 314. 1845.

OEnothera scapoidea var. *aurantiaca* S. Wats. Proc. Am. Acad. **8**: 595. 1873.

Southern California and Arizona.

7. CHYLISMA BREVIPES (A. Gray).

OEnothera brevipes A. Gray, Pacif. R. R. Rep. 4: 87. 1857.

OEnothera clavaeformis Torr. Bot. Mex. Bound. Surv. 66. In part. 1859.

Southern California and Arizona.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE.—No. 94.

A Preliminary Revision
— of the —
North American Isotheciaceae.

BY A. J. GROUT.

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 23, No. 6, June, 1896.]

A preliminary Revision of the North American Isotheciaceae.

By A. J. Grout.

During the past winter a critical study of this family of mosses has been made at the Herbarium of Columbia University. Wishing to obtain more material illustrating the distribution of the species, a brief summary is here presented, giving the distribution, so far as can be determined, from material at hand. Persons having specimens from outside the range here indicated will confer a great favor by sending them to me at the Herbarium of Columbia University. If duplicates can also be sent, a suitable return will be made for them. I am already greatly indebted to several persons for aid in my work, for which acknowledgments will be made in the final publication.

ISOTHECIACEAE Spruce, Ann. and Mag. Nat. Hist. (II.) **3**: 285. 1849.

Gametophyte generally large, never minute. Primary stems creeping, radiculose. Paraphyllia lacking (except in *Climacium*). Leaves smooth, often plicate or concave; median leaf-cells linear, alar cells quadrate (except in *Holmgrenia*).

Sporophyte. Seta smooth, twisted. Calyptra cucullate. Operculum conic to conic-rostrate. Columella persistent. Capsule erect, straight, not conspicuously contracted under the mouth when dry. Peristome double, well developed; teeth lanceolate, articulate. Segments of endostome linear to lanceolate, attached to a narrow basal membrane, free, or adherent to the teeth in two species of *Pylaisiella*; cilia rudimentary or wanting. Spores roughened.

Distinguished from the Brachytheciaceae by the straight erect capsule, absence of cilia, short basal membrane, capsule not contracted under the mouth when dry.

Homalothecium and certain species of *Brachythecium* (notably *B. acuminatum*) have the capsule characters of this family, but their other characters show their relationship to be with the Brachytheciaceae.

Key to the Genera.

- Leaves veined, vein single, extending to the middle of the leaf or beyond. 4. CLIMACIUM.
- Leaves veinless or the veins short and double.
  - Alar cells not quadrate. 3. HOLMGRENIA (*Orthothecium*).
  - Alar cells quadrate.
    - Complanate foliate (except *E. repens* and *E. seductrix*) with very large persistent annulus (except *E. Drummondii*). 1. ENTODON (*Cylindrothecium*).
    - Leaves more or less falcate-secund especially at the tips of branches; annulus narrow. 2. PYLAISIELLA (*Pylaisia*).

1. ENTODON. C. Muell. Linnaea, **18**: 704. 1844. Also Bot. Zeit. **1894**: 740.

[CYLINDROTHECIUM Br. & Sch. Bry. Eur. fasc. 46 and 47. *pl.* *464, 465.* 1851.]

- Leaves obtuse, quadrate; alar cells of 2 or 3 layers. 7. *E. orthocarpus.*
- Leaves acute or acuminate, quadrate, alar cells of one layer.
  - Leaves gradually narrowly acuminate; segments of endostome adhering to the teeth. 8. *E. brevisetus.*
  - Leaves acute to apiculate; segments free.
    - Teeth conspicuously hyaline margined. 6. *E. repens.*
    - Teeth not conspicuously hyaline margined.
      - Annulus apparently none; seta yellow. 5. *E. Drummondii.*
      - Annulus of narrow small cells; seta red. 2. *E. seductrix.*
      - Annulus large, of large cells.
        - Teeth uniformly papillose-roughened. 3. *E. compressus.*
        - Teeth conspicuously striolate above; leaves serrate. 4. *E. Sullivantii.*
        - Teeth not conspicuously striolate; leaves nearly entire. 1. *E. cladorrhizans.*

1. **ENTODON CLADORRHIZANS** (Hedw.) C. Muell. Linnaea, 18: 707. 1844.

Cylindrothecium cladorrhizans Schimp. Syn. Ed. 1: 514. 1860.
Entodon Transylvanicus Demet. Hedwigia, 23: 81. 1884.
Entodon minutipes Kindb. Can. Rec. Sci. 1894: 21. 1894.

Not uncommon in North America east of the Mississippi; Minnesota (Holzinger), Iowa (A. S. Hitchcock and Miss McGee).

Limpricht, in Rab. Krypt. Fl. 4: part 3: 30, separates *E. Schleicheri* of Europe from *E. cladorrhizans* and also cites *E. cladorrhizans* as European. That the two species are distinct can hardly be doubted, if the peristomal teeth be compared. *E. acicularis* C. Muell. and Kindb. in Macoun, Cat. Can. Pl. part 6, 176, [Macoun's 816 (in part) and 170,] is only a peculiar form of *E. cladorrhizans*. It may possibly prove to be a good variety. It is characterized by having a peculiar brownish green color, the tips of branches lighter; very short turgid branches which are largest in the middle and at the largest part bear leaves as large as the stem leaves; capsule and seta much shorter and teeth more perforate than is typical. *E. Transylvanicus* Demeter and *E. minutipes* Kindb. are said by Limpricht, l. c. to be identical, and only slightly divergent forms of *E. cladorrhizans*. I have been unable to see specimens of either.

2. **ENTODON SEDUÇTRIX** (Hedw.) C. Muell. Linnaea, 19: 214. 1847.

Neckera seductrix Hedw. Spec. Musc. 208. *pl. 47. f. 8–13.* 1801.

Pterigynandrum Carolinianum Brid. Musc. Recent. Suppl. 1: 132. 1803.

Cylindrothecium seductrix Sull. in A. Gray, Man. Ed. 2: 664. 1856.

A very variable species and appropriately named, found only in the eastern United States. Common in the Appalachian region from Canada to the Gulf; less frequent northward and not reported far west of the Mississippi. I have seen no specimens from northern New England or eastern Canada.

Dallas, Texas, (J. Ball), Missouri, Kansas, Wisconsin, Minnesota, Ontario.

2a. E. SEDUCTRIX LANCEOLATUS n. var.

Stem leaves ovate-lanceolate, acute; branch leaves broadly lanceolate, tapering gradually to the serrate acute apex. On rotton wood, Hanging Rock, Wabash Co., Ill., April 3, 1890. (J. Schneck.)

2b. E. SEDUCTRIX MINUS Aust. Mss. in herb.

Entire plant much reduced, dirty green; leaves, seta and capsule shorter than in type. Capsule 1.5–2 mm. long, its length about 3 times its diameter.

Ohio, Sullivant. Sand hill near Augusta, Ga., J. D. Smith, Feb. 2, 1877. A portion of no. 388 of Sull. and Lesq. Musc. Bor. Am., in Columbia Herb., issued as *Cylindrothecium compressum* Br. and Sch. is this variety.

2c. E. SEDUCTRIX DEMETRII (Ren. & Card.).

Entodon Demetrii Ren. & Card. Rev. Bry. **20**: 14. 1893.

Stems irregularly divided and branched, strongly complanate-foliate, slender, having almost exactly the facies of *E. compressus*; leaves ovate, gradually acute, very entire. Peristomal teeth often irregularly perforate.

On stones at top of well, Emma, Saline Co., Mo., Rev. C. H. Demetrio.

3. ENTODON COMPRESSUS (Hedw.) C. Muell. Linnaea, **18**: 707. 1844.

Leskea compressa Hedw. Spec. Musc. 232. *pl. 56. f. 1–7.* 1801.

Cylindrothecium compressum Br. & Sch. Bry. Eur. fasc. 46 and 47. 1851.

Rhode Island, New Jersey, Ohio, Illinois, Kansas, Nebraska, Missouri. Rare.

4. ENTODON SULLIVANTII C. Muell. Can. Rec. Sci. **1894**: 21. 1894.

Neckera Sullivantii C. Muell. Syn. Musc. **2**: 65. 1851.

Cylindrothecium Sullivantii Sull. in A. Gray, Man. Ed. **2**: 664. 1856.

North Carolina (Gray and Sullivant), Tennessee (Lesquereux), South Carolina. Very rare.

5. ENTODON DRUMMONDII (Br. & Sch.) Jaeger & Sauerb. Ber. St. Gall. Nat. Gesell. **1876–77**: 282.

Cylindrothecium Drummondii Br. & Sch. Bry. Eur. fasc. 46 and 47. 1851.

Southern U. S., east of the Mississippi, north to Tennessee and North Carolina. Northern Mexico (Pringle).

6. ENTODON REPENS (Brid.).

Pterigynandrum repens Brid. Musc. Recent. Suppl. **1**: 131. 1806.

Platygyrium repens Br. & Sch. Bry. Eur. fasc. 46 and 47. *pl. 458.* 1851.

Cylindrothecium repens De Not. Epil. 214. 1869.

North America, east of the Rocky Mountains. Common.

6a. ENTODON REPENS ORTHACLADOS (Kindb.).

Platygyrium repens orthoclados Kindb. in Macoun, Cat. Can. Pl. **6**: 172. 1892.

Platygyrium repens sciuroides Limpr. Rab. Krypt. Fl. **4**: part 3, 7. 1896.

Platygyrium repens ramulis elongatis Bry. Eur. *pl. 458. f. 3.*

Branches much larger and longer than in the species, leaves larger, loosely imbricate, shortly bicostate.

Ontario, Macoun Canadian Mosses, no. 259.

7. ENTODON ORTHOCARPUS (La Pyl.) Lindb. Musc. Scand. 39. 1829.

Hypnum Schreberi orthocarpum Brid. Bry. Univ. **2**: 422. 1827.

Hypnum orthocarpum La Pylaie; Brid. Bry. Univ. **2**: 422. 1827.

Cylindrothecium concinnum Schimp. Syn. 515. 1860.

Colorado, Brandegee. Although collected but once and in a sterile state, Brandegee's specimens are undoubtedly this species.

8. ENTODON BREVISETUS (Hook. & Wils.) Jaeger & Sauerb. Ber. St. Gall. Nat. Gesell. **1876–77**: 291.

Neckera breviseta Hook. & Wils. Lond. Jour. Bot. **4**: 419. *pl. 24. f. a.* 1842.

Cylindrothecium brevisetum Br. & Sch. Bry. Eur. fasc. 46–47. 1851.

New Jersey, Virginia, Pennsylvania, Ohio, Missouri, Canaan Forks, New Brunswick (J. Moser). Rare.

ENTODON MACOUNII C. Muell. & Kindb. in Macoun, Cat. Can. Pl. 6: 177. 1892.

Authentic specimens from type locality in Herb. Macoun are not referable to *Entodon* at all, but are one of the complanate-foliate Hypneae. Capsules are needed to classify them. There are no quadrate alar cells and the cells at the angles are so little enlarged as to be scarcely noticeable.

ENTODON (?) EXPALLENS C. Muell. & Kindb. in Macoun, Cat. Can. Pl. 6: 177. 1892.

This species belongs to the same group as *E. Macounii.*

ENTODON SUBFLACEUS C. Muell. & Kindb. Can. Rec. Sci. **1894**: 21.

I have been unable to examine any specimens of this species, as Prof. Macoun has none in his herbarium.

CYLINDROTHECIUM FLORIDANUM Duby, Regensb. Flora, **58**: 284, is probably not related to *Entodon*, as the horizontal capsules described are not in accordance with the characters of the genus. We have not been able to obtain a specimen of it, as the type cannot be found in the Duby nor the Boissier herbaria at Geneva.

2. PYLAISIELLA Kindb. Can. Rec. Sci. **1894**: 21.

[PYLAISIA Br. & Sch. Bry. Eur. fasc. 46–47. 1851. Not Desv. 1814.]

The generic name *Pylaisia* was first used by Desvaux in 1814 to designate a new genus named in honor of De La Pylaie. The specimen upon which his genus was founded is stated to be nothing more than a depauperate form of *Hypnum denticulatum* L.

In 1851 Bruch and Schimper took up the name for a new genus founded on *Hypnum polyanthos* Schreb, thus publishing a homonym.

DeNotaris in 1869 extended the genus *Pylaisia* by including *Orthothecium* of the Bryol. Eur., and in this extended form it was degraded by Lindberg in 1879 to a sub-genus of *Stereodon* of Mitten. The name *Pylaisiella* proposed by Kindberg for two species of the genus, viz.: *P. velutina* and *P. subdenticulata*, is very appropriate, as it will preserve the name of De La Pylaie.

Segments of the endostome entirely free from the teeth.	
Operculum conic; cilia present, rudimentary.	1. *P. polyantha.*
Operculum short, rostrate; cilia lacking.	2. *P. subdenticulata.*
Segments partially or wholly adherent to the teeth:	
Partially adherent; spores 18–24 μ.	3. *P. intricata.*
Wholly adherent; spores 25–30 μ.	4. *P. velutina.*

1. PYLAISIELLA POLYANTHA (Schreb.).

Hypnum polyanthos Schreb. Spicil. Flor. Lips. 97. 1771.

Pylaisia polyantha Br. & Sch. Bry. Eur. fasc. 46 and 47. *pl.* 455. 1851.

Stereodon polyanthos Mitt. Journ. Linn. Soc. **8**: 40. 1865.

Pylaisia heteromalla Br. & Sch. Lond. Jour. Bot. **2**: 669. 1843.

Hypnum polyanthum pallidifolium C. Muell. Syn. **2**: 337. 1851.

Pylaisia Ontariense C. Muell. & Kindb. in Macoun, Cat. Can. Pl. 6: 174. 1892.

Canada and northwestern United States (Macoun); Kakabeka Falls, Ont. (Mrs. Britton); Saskatchewan and Rocky Mountains (Bourgeau); Santa Fé (Fendler); White Mountains (James); Montana (R. S. Williams); Pike's Peak, Colo. (S. L. Clarke); Minnesota (F. F. Wood). Apparently widely distributed in Canada and along the northern border of the United States in mountainous regions, but rather infrequent and local.

The typical American form of this species is quite variable in leaf characters, even on the same plant, but it differs constantly from European specimens in that the leaves are shorter, more abruptly acuminate and more broadly ovate-lanceolate. The length of the leaf of the European form averages 1.5 mm.; that of the American 1 mm., though I have found one plant whose leaves measured 1.4 mm. The length of the acumination of the perichaetial leaves is also very variable. It may be that our forms of this and the next species are but two varieties of the European *P. polyantha.* The American *polyantha* answers very closely to the description of *P. polyantha brevifolia* Lindb. & Aruell, Musc. Asiae-bor. 152. 1890. I have seen the type specimens of *P. heteromalla* from Schimper's herbarium and not only are they *P. polyantha,* but

Schimper himself indicated clearly on his labels that he did not consider it a good species; Drummond's no. 222, on which this species was founded, is evidently somewhat mixed, as the Columbia Herbarium specimen is *P. intricata.*

1a. PYLAISIELLA POLYANTHA JAMESII (Sull.) E. G. Britton.

Pylaisia Jamesii Sull. & Lesq. Musc. Bor. Am. Ed. 2. 383. 1865.

Pylaisia subdenticulata obscura Lesq. & James, Mosses N. A. 309. 1884.

Gametophyte smaller than the type; leaves shorter, broadly ovate-lanceolate, shortly bicostate; length of leaf-cells 4–6 times their diameter; quadrate alar cells numerous; perichaetial leaves shorter, abruptly acuminate.

Sporophyte with shorter subulate-lanceolate peristomal teeth, which are also shorter than the segments.

On the ground and roots of trees. Chelsea, Mass. (James.)

This variety has the appearance of *P. subdenticulata* because of its reduced size, otherwise it has the characters of American *polyantha*, such as conic operculum and rudimentary cilia.

1b. PYLAISIELLA POLYANTHA PSEUDO-PLATYGYRIA (Kindb.).

Pylaisia pseudo-platygyrium Kindb.; Macoun, Cat. Can. Pl. **6**: 173. 1892.

Pylaisia filari-acuminata Kindb. l. c. 174.

Leaves narrowly long-acuminate; upper branch leaves distantly serrate-dentate along sides of acumination; inner perichaetial leaves often long-acuminate, serrate-dentate along the acumination; cilia 1 or 2, better developed than in the type.

Type locality, shores of Lake Nipigon, Ontario. Also found on the west side of the Columbia River, at Revelstoke, B. C.

On decayed trunks and on "logs subject to inundation."

Exsiccata: Macoun, Can. Musc. 626. (*Pylaisia filari-acuminata.*)

2. PYLAISIELLA SUBDENTICULATA (Schimp.) Kindb. Can. Rec. Sci. 1894: 22.

Pylaisia subdenticulata Schimp. Bry. Eur. fasc. 46 and 47. 1851.

Pylaisia denticulata Sull. in A. Gray, Man. Ed. 2, 62. 1856. New York and New Jersey (Austin); Maryland (Holzinger); Ohio (H. J. Biddlecome); Athens, Ill. (Hall). Very close to *P.*

polyantha, but distinguished by the reduced size, rostrate operculum and absence of cilia.

3. PYLAISIELLA INTRICATA (Hedw.).

Pterigynandrum intricatum Hedw. Spec. Musc. 85. *pl. 18.* 1801.
Pylaisia intricata Schimp. Bry. Eur. fasc. 46 and 47. 1851.
Hypnum intricatum C. Muell. Syn. **2**: 338. 1851.
Stereodan intricatus Lindb. Musc. Asiae-bor. **2**: 151. 1890.
Pylaisia Selwinii Kindb. Ott. Nat. **2**: 156. 1889.

Common in the northeastern United States and eastern Canada, Kansas, Missouri, Misisssippi, Georgia (Ravenal), Florida (Chapman).

This species is easily distisguished by its curved branches, numerous quadrate alar cells and partially adherent segments. It varies a great deal in length of leaves and in length of leaf-cells, length and color of capsule and size of spores. Authentic specimens of *Pylaisia Seliwinii* Kindb. show that it is merely a form of this species growing in exposed dry places. The plants are darker and the leaves more strongly recurved than usual.

4. PYLAISIELLA VELUTINA (Schimp.) Kindb. Can. Rec. Sci. **1894**: 21.

Pylaisia velutina Schimp. Bry. Eur. fasc. 46 and 47. 1851.

New Brunswick, and Mt. Desert, Maine, south to North Carolina, west to Ohio and Indiana.

Distinguished from *P. intricata* by the entirely adherent segments, narrower leaves with fewer quadrate alar cells, and larger spores.

Pylaisia revolutifolia Kindb. in Herb. Macoun, from Leamington, Ont., August 4, 1892, and Pelee Point, Ont., is *Entodon repens*.

3. HOLMGRENIA Lindb. Öfv. Vet.-Ak. Förh. **1862**: 605. 1863.

[ORTHOTHECIUM Br. & Sch. Bry. Eur. fasc. 48. 1851. Not Schott. & Endl. Melet. Bot. 31. 1832.]

Gametophyte large (5–10 cm. high); leaves strongly plicate	1. *H. chrysea.*
Gametophyte small (2 cm. high); leaves not plicate.	2. *H. stricta.*

1. **Holmgrenia chrysea** (Schwaegr.) Lindb. Öfv. Vet.-Ak. Förh. 1862: 605. 1863.

Hypnum chryseum Schwaegr. Schulte's Reise auf. d. Glockner, 2: 364. 1804.

Orthothecium chryseum Br. & Sch. Bry. Eur. fasc. 48. *pl. 461.* 1851.

Very rare. Rocky Mountains (Macoun, Drummond); Saskatchawan (E. Bourgeau).

2. **Holmgrenia stricta** Lorentz, Moos Stud. 122. *pl. 5.* 1864.

Stereodon rubellus Mitt. Journ. Linn. Soc. **8**: 40. 1865.

Orthothecium rubellum Kindb. Laubm. Schwed. u. Norw. 46. 1883.

Orthothecium intricatum var. *rubellum* Husnot, Musc. Gall. 173. 1893.

Davis Strait (Taylor). In several sets of Drummond's mosses no. 73, from the Rocky Mountains (distributed as *Catoscopium nigritum*), there is no trace of this species. Dr. Mitten kindly sent a portion of the Davis Strait plant and indicates that *Holmgrenia rufescens* (Dicks.) Lindb. has not yet been found in North America. In a letter dated April 21, 1896, he says: "I have looked through all my specimens of *Orthothecium rufescens* and find no trace of any North American examples. All Taylor sent me are in with *O. chryseum*, as are the 221 of Drummond in both my sets. I suppose I must have mistaken one of Taylor's to be the first named."

4. CLIMACIUM Web. & Mohr, Iter Suec. 96. 1804.

Capsules 3–4 times and median leaf-cells 10 times as long as broad.
1. *C. dendroides.*
Capsules 5–6 times and median leaf-cells 2–7 times as long as broad.
2. *C. Americanum.*

1. **Climacium dendroides** Web. & Mohr, Iter Suec. 96. 1804.

The northern and western species. New Brunswick to St. Paul Island, Behring sea, south to New Jersey, Colorado and California. Not represented from Pennsylvania or the North Central States.

1a. .CLIMACIUM DENDROIDES OREGONENSE Ren. & Card. Bot. Gaz. 15: 59. 1890.

Type from Oregon, Willamette R. (L. F. Henderson). A specimen from Sauvie's Island, Oregon (C. G. Pringle no. 510), is probably referable to this variety, as the leaves are almost entire, although broader instead of narrower than in the type.

2. CLIMACIUM AMERICANUM Brid. Musc. Suppl. part 2, 45. 1812.

The southern and eastern species, ranging from Canada to North Carolina and probably south to the Gulf; west to Minnesota, Iowa, Illinois and Missouri.

2a. CLIMACIUM AMERICANUM KINDBERGII Ren. & Card. Bot. Gaz. 15: 1890.

C. Americanum fluitans Aûst. Musc. App. 49. no. 289. Name only. 1870.

Varying greatly in appearance. Leaves characterized by oblong-hexagonal areolation and lack of auricles. The dendroid form, which is found especially in southern swamps, has often been mistaken for *C. dendroides*. Has the range of the type and extends to the Gulf. The Columbia Herbarium specimens of Sull. & Lesq. Musc. Bor. Am. Ed. 2, no. 42, and Drummond's Musc. Am. (Southern States), 120, are this variety.

CLIMACIUM RUTHENICUM Lindb. is not a *Climacium*. Its affinities are uncertain, but is not one of the Isotheciaceae.

HOMALOTHECIUM Br. & Sch. Bry. Eur. fasc. 46 and 47. 1851.

This genus is so closely allied to *Camptothecium* that it is clearly a violation of natural relationships to put it in another family. The nearly erect and symmetric capsule and the incomplete peristome are the only characters associating *Homalothecium* with the Isotheciaceae.

ISOTHECIUM Brid. Bryol. Univ. 2: 355. *pl. 10.* 1827.

Schimper, Synopsis, Ed. 2; 662, separates *Isothecium myosuroides* (L.) Brid. from the genus of which *I. myurum* (Pollich) Brid. remains the type. *I. myosuroides* clearly belongs to the Brachytheciaceae and all our American species are closely allied to it. Thus we have no American species of *Isothecium*.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE.—No. 95.

Revision of the Genus Asimina in North America.

BY GEO. V. NASH.

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 23, No. 6, June, 1896.]

Revision of the Genus Asimina in North America.

By Geo. V. Nash.

The genus *Asimina* was founded by Adanson * in 1763. Catesby's † figure, on which Linnaeus ‡ based his *Annona triloba*, is cited by Adanson, thus leaving no doubt as to the type of the genus. In 1803, Michaux § gave the name of *Orchidocarpum* to this group of plants, probably from the resemblance of the young carpels to the tuberous roots of many members of the Orchidaceae. Torrey and Gray ‖ merged *Asimina* in *Uvaria*, to which it cannot be referred, the difference in size of the outer and inner petals readily separating it from that genus. This was the view later held by Dr. Gray, as set forth in the Botanical Gazette,** where the characters, maintaining *Asimina* as distinct from *Uvaria* and worthy of generic rank, are indicated.

The genus is restricted to North America, with a possible extension into Mexico, if the three or four imperfectly known species occurring there prove to belong to this genus, a question about which there is considerable doubt. The forms from the West Indies, placed here by Grisebach,†† would seem to belong elsewhere, the uniform size of the outer and inner petals excluding them from *Asimina*.

In North America the genus *Asimina* is mainly confined to the southeastern parts of the United States, one species only, *A. triloba*, occurring as far north as southern New York and Michigan, and extending to the west, along the Gulf, as far as eastern Texas. This appears to be the only one that occurs any great distance beyond the general range of the genus, with the possible exception of *A. parviflora*, which, according to Dr. Chapman, in his Flora of the Southern States, occurs in North Carolina. I have seen no specimens authenticating this, however; in fact, Georgia is the most northern state from which I have seen specimens of this species. The remainder of the genus is confined to Georgia, Florida and Alabama.

---

* Fam. Pl. **2**: 365.

† Nat. Hist. **2**: 85. *pl. 85*.

‡ Sp. Pl. 537. 1753.

§ Fl. Bor. Am. **1**: 329.

‖ Fl. N. A. **1**: 45. 1838.

** **11**: 161–2. 1886.

†† Cat. Pl. Cub. 3. 1866.

Asimina, as here understood, comprises seven species, one of which, though quite common in herbaria, has remained undescribed up to the present time, owing to its early and wrong identification with the *A. grandiflora* of Dunal,* which was based on the *Annona grandiflora* of Bartram.† These excellent figures, and the description accompanying that of Dunal, make it difficult to understand why such a mistake should have occurred. This matter will be discussed later, in its proper place.

A large number of specimens, contained in the herbarium of Columbia University, has been examined. In addition to these, the material in the National Herbarium and that in the herbarium of Prof. Lester F. Ward, at Washington, have been kindly loaned for examination. The study of this material has seemed to warrant the following disposition of the species.

Key to the Species.

Flowers borne in the axils of the deciduous leaves of the preceding year, hence appearing before or with the leaves.
  Leaves thin, not reticulated; a solitary purple flower in the axil.
    Mature outer petals 2 cm. long or larger, more than twice the length of the sepals; a small tree 3–12 metres high. 1. *A. triloba.*
    Mature outer petals 1 cm. long or smaller, less than twice as long as the sepals; a small shrub 15 dm. high or less. 2. *A. parviflora.*
  Leaves thick, leathery and reticulated when old; 1 or 2 yellowish white flowers and often a branchlet arising from the same axil.
    Young leaves sparingly tomentose above and soon glabrous, tomentose beneath; mature outer petals 2.5–4 cm. long. 3. *A. reticulata.*
    Young leaves densely tomentose on both sides; mature outer petals 4–5 cm. long. 4. *A. speciosa.*
Flowers terminal, or borne in the axils of the leaves of the season, hence appearing after the leaves.
  Flowers terminal, sessile or nearly so; leaves short and broad, obovate to oval. 5. *A. obovata.*
  Flowers axillary and long-peduncled, rarely single and terminal in No. 7; leaves long and narrow, oblanceolate to oblong.

---

* Monog. Anon. *pl. 11.* 1817.

† Travels, *pl. 2.* 1791.

Mature outer petals 3 cm. long or less, changing color, becoming deep black-purple at the time of falling. 6. *A. pygmaea.*

Mature outer petals 3.5 cm. long or more, not changing color, remaining yellowish white at the time of falling. 7. *A. angustifolia*

1. ASIMINA TRILOBA (L.) Dunal, Monog. Anon. 83. 1817.

Anonna triloba L. Sp. Pl. 537. 1753.
Orchidocarpum arietinum Michx. Fl. Bor. Am. **1**: 329. 1803.
Porcelia triloba Pers. Syn. **2**: 95. 1807.
Uvaria triloba Torr. & Gr. Fl. N. A. **1**: 45. 1838.

A small tree, 3–12 metres tall, the bark of the mature branchlets reddish brown or sometimes gray. Branchlets and leaves when young, peduncles, exterior surface of the sepals and young petals tomentose with reddish brown hairs; mature leaves obovate or obovate-cuneate, 10–30 cm. long, 4–11 cm. wide, abruptly acuminate at the apex, usually acute, but sometimes rounded at the base, thin, glabrous above, the midrib and primary nerves, which are prominent on the lower surface, usually more or less pubescent; petioles 1 cm. long or less, glabrous or sparingly pubescent; flowers in the axils of the deciduous leaves of the preceding year, on peduncles 8–15 mm. long, which are often recurved; sepals from ovate to orbicular-ovate, 8–12 mm. long; petals at first greenish, later purple and conspicuously veined, the outer ones nearly orbicular, 2–2.5 cm. long, more than twice the length of the sepals; fruit 7–15 cm. long, 2.5–4 cm. thick, oblong, cylindric, when full grown at first hard, green and glaucous, later turning yellow, and when fully ripe becoming soft and edible and brown or almost black in color; seeds brown, oblong, 2–2.5 cm. long, 1–1.5 cm. broad, compressed, obtuse at the apex and usually obliquely truncate at the hilum.

Rich and moist soil from western New York and Pennsylvania to southern Michigan and Kansas, south to middle Florida and eastern Texas.

A large number of specimens of this, the most frequent and widely distributed species, were examined, but it is so well known that a detailed list is not necessary.

2. ASIMINA PARVIFLORA (Michx.) Dunal, Monog. Anon. 82. *pl. 9.* 1817.

Orchidocarpum parviflorum Michx. Fl. Bor. Am. **1**: 329. 1803.
Porcelia parviflora Pers. Syn. **2**: 95. 1807.
Uvaria parviflora Torr. & Gr. Fl. N. A. **1**: 45. 1838.

A small shrub 15 dm. tall or less, with gray to reddish bark. Branchlets, young leaves, particularly the lower surface, peduncles, and the outside of the young sepals and petals tomentose with bright reddish brown hairs; mature leaves 6–17 cm. long, 3–9 cm. wide, obovate to oblong-obovate, acute at the apex, narrowed at the base, thin, glabrous above, usually more or less tomentose beneath, especially on the midrib and veins; petioles tomentose, 6 mm. long or less; flowers solitary from the axils of the deciduous leaves of the preceding year, on peduncles 5 mm. long or less; sepals ovate, 5–7 mm. long; mature outer petals ovate to broadly oval, 7–10 mm. long, less than twice the length of the sepals; fruit, not fully mature, oblong, about 3 cm. long, sparingly pubescent.

In the low and middle country from North Carolina (according to Dr. Chapman) to Florida, west to Alabama.

Specimens examined:

Georgia: Small, Gwinnett Co., July 20, 1893; Stone Mountain, May 1–18, 1895.

Florida: Curtiss, nos. 85, 4201 and 4545, all from the vicinity of Jacksonville.
Canby, Hibernia, March, 1869.
J. D. Smith, no. 27, Clay Co., March 10, 1883.
Rugel, near Tallahassee, April, 1843.
Chapman, no data.
Le Conte, no data.

Alabama: Buckley, April and June.
Winchell, no data.

3. ASIMINA RETICULATA Shuttlw.; Chapm. Fl. S. St. 603. 1884.

Asimina cuneata Shuttlw.; A. Gray, Bot. Gaz. 11: 163. 1886.

A small shrub 5–10 dm. tall, with bark of a grayish brown to brown color, the branchlets, lower surface of the young leaves, peduncles and the exterior surface of the sepals and young petals densely tomentose with reddish brown hairs. Young leaves somewhat tomentose above, soon glabrous; mature leaves narrowly oblong, inclining to narrowly obovate or oblanceolate, 2.5–9 cm. long, .5–2 cm. broad, thick and leathery, glabrous, reticulated, the midrib and nerves prominent beneath; petioles 1–2 mm. long; flowers on peduncles 5–8 mm. long, from the axils of the deciduous leaves of the preceding year, sometimes accompanied by a branchlet; sepals ovate, 5–7 mm. long; mature outer petals oval to obovate, 2.5–4 cm. long, 1.2–1.5 cm. broad, much exceeding the inner ones and about five times the length of the sepals, pubescent on the outside, particularly toward the base; immature fruit obovate, nearly glabrous.

Pine barrens of Peninsular Florida.

Specimens examined:

Garber, Tampa, May, 1876.

Lester F. & Rosamond Ward, Tampa, February 27, 1891.

Nash, Tampa, no 2477, August, 1895.

Hubbard, March 1, 1883, no locality.

Simpson, 1880, no locality, but probably in the vicinity of Manatee.

Webber, no. 148, Mt. Dora, Lake Co., March, 1894.

Palmer, no. 6, Fort Capron, Indian River, 1874.

Bates, Merritt's Island, Indian River, March and April, 1889.

4. ASIMINA SPECIOSA.

Orchidocarpum grandiflorum Michx. Fl. Bor. Am. 1: 330. 1803.?

Porcelia grandiflora Pers. Syn. 2: 95. 1807.?

Uvaria obovata Torr. & Gr. Fl. N. A. 1: 45. 1838.

Asimina grandiflora A. Gray, Bot. Gaz. 11: 163. 1886. Not Dunal. 1817.

A small shrub, 6–12 dm. tall, with gray smooth bark. Branchlets, as well as the peduncles and both surfaces of the young leaves, densely tomentose with yellowish or tawny hairs; mature leaves oblong, narrowly obovate or obovate, 7–14 cm. long, 2.5–7 cm. broad, thick and leathery, reticulated, tomentose on both sides, sparingly so above; petioles 3–7 mm. long, densely tomentose; flowers, sometimes accompanied with a branchlet, from the axils of the deciduous leaves of the preceding year, on peduncles 7–18 mm. long; sepals ovate, 6–8 mm. long, tomentose; mature outer petals oval to obovate, 4–5 cm. long, 2.5–3.5 cm. broad, much exceeding the inner ones, and about six times as long as the sepals, pubescent, particularly on the outside near the base; immature fruit glabrous.

This plant has been referred to the *A. grandiflora* Dunal, which was based on *Annona grandiflora* Bartram. It is not that plant, as is plainly indicated by a reference to the excellent figures of Bartram* and of Dunal† where the flowers are shown as terminating the branchlets. The description of Dunal,‡ moreover, calls for a

---

* Travels *pl. 2.* 1791.

† Monog. Anon. *pl. 11.* 1817.

‡ l. c. 84.

plant with sub-sessile flowers and the branchlets and the lower surface of the leaves "rufo-pubescentibus," characters certainly not to be found in *A. speciosa*, the flowers of which are lateral, from the axils of the deciduous leaves of the preceding year, and the pubescence merely yellowish white or tawny. The long peduncles also serve well to distinguish this from the true *A. grandiflora* Dunal, which is described in this revision under the name *A. obovata*.

Sandy pine barrens, southeastern Georgia and East Florida.

Specimens examined:

Georgia: Small, Trader's Hill, Charlton Co., June 12–15, 1895.

Florida: Curtiss, nos. 86, 4,200 and 4,588, and a specimen with no number collected in 1875, all from the vicinity of Jacksonville.

Reynolds, March–May, 1871.
Chapman, East Florida, 1871.
Canby, Hibernia, March, 1869.
Palmer, no. 4, Fort Capron, Indian River, 1874.

5. ASIMINA OBOVATA (Willd.).

Annona grandiflora Bartr. Trav. 18. *pl. 2.* 1791. Not Lamarck. 1786.

Annona obovata Willd. Sp. Pl. 2: 1269. 1800.

A shrub or small tree, 1.5–2 metres tall, with grayish brown bark. Branchlets, petioles and the lower surface of the leaves, especially the midrib and nerves, tomentose with bright reddish brown hairs; leaves 4–10 cm. long, 2–5 cm. broad, narrowly obovate to obovate, or the smaller ones often oval, glabrous above, on petioles 3–5 mm. in length; flowers sessile or nearly so, terminating the branchlets; sepals ovate or oval, 10–12 mm. long, tomentose when young, later glabrate; petals yellowish white, glabrous, mature outer ones obovate, 5–6 cm. long; fruit not seen.

Pine lands in eastern and central peninsular Florida.

Specimens examined:

Nash, no. 178, Eustis, Lake Co., March 1894.

Hulst, DeLand, March, 1891.

Bates, Merritt's Island, Indian River, March and April, 1889.

The earlier publication by Lamarck of an *Annona grandiflora* † invalidates the use of this name by Dunal, so that given by Willdenow is here taken up, being the oldest one available.

---

† Encycl. 2: 126. 1786.

6. ASIMINA PYGMAEA (Bartr.) A. Gray.

Annona pygmaea Bartr. Trav. 18. *pl. 1.* 1791.

Asimina pygmaea A Gray, Bot. Gaz. 11: 164. 1886. Not Dunal, 1817.

A small plant, 2–4 dm. tall. Stems simple, or rarely somewhat branched, arcuate, often nearly prostrate, 2–several from the same root, somewhat shrubby below, reddish, glabrous at the base, often tomentose at and near the summit; young leaves more or less tomentose, especially beneath; mature leaves often erect, thereby appearing as if secund, oblong, oblanceolate, or spatulate-obovate, 5–15 cm. long, 1–4 cm. broad, rounded, obtuse or acutish at the apex, acute at the base, glabrous, reticulated, the midrib and principal nerves very prominent beneath, sessile, or on petioles 8 mm. long or less; flowers solitary in the axils, on slender glabrous, or somewhat tomentose, often recurved peduncles 1–1.5 cm. long; sepals ovate, 7–10 mm. long, tomentose when young, glabrate when old; petals greenish and slightly pubescent externally when young, becoming dull black-purple and glabrous at the time of falling, the mature outer ones narrowly obovate, 2–3 cm. long, 8–12 mm. broad; fruit not seen.

Pine lands in eastern and peninsular Florida.

Specimens examined:

Curtiss, nos. 87, 4202 and 4742, all from the vicinity of Jacksonville.

Nash, nos. 359 and 1919, in the vicinity of Eustis, Lake Co.

Palmer, no. 7, Fort Capron, Indian River, 1874.

Burroughs, no data.

Powell, 1872.

7. ASIMINA ANGUSTIFOLIA A. Gray, Bot. Gaz. 11: 163. 1886.

Orchidocarpum pygmaeum Michx. Fl. Bor. Am. 1: 330. 1803.

Porcelia pygmaea Pers. Syn. 2: 95. 1807. ?

Asimina pygmaea Dunal, Monog. Anon. 84. *pl. 10.* 1817.

Uvaria pygmaea Torr. & Gr. Fl. N. A. 1: 45. 1838.

A small shrub, 4–6 cm. tall. Stems several from the same root, erect or reclining, much branched, glabrous excepting at the summit, the old bark gray, the young bark reddish; leaves very variable, 5–20 cm. long, 1–3 cm. broad, linear to oblong-linear or oblanceolate, acute or obtuse at the apex, acute at the base, glabrous, reticulated, the midrib prominent beneath, sessile, or on petitoles 7 mm. long or less; flowers solitary in the axils of the leaves, or rarely terminating the branches, on slender glabrous or sparingly pubescent peduncles 1–2 cm. long; sepals ovate, nearly glabrous, 1–1.5 cm. long; mature outer petals oblong-obovate to obovate, 3.5–6 cm. long, 2–3 cm. wide, yellowish white, even at the time of falling; fruit, probably not fully grown, cylindric-oblong, about 3 cm. in length.

Pine lands in Georgia and north Florida.

Specimens examined:

Georgia: Small, Albany, Dougherty Co., July, 1895; Bainbridge, Decatur Co., June, 1895; Albany, Dougherty Co., May 24–28, 1895.

Florida: Chapman, Apalachicola.
Curtiss, no. 87 *, Gainesville.
Nash, no. 2153, Lake City, Columbia Co., July 11–19, 1895.
Leavenworth, vicinity of Fort King and Fort Drane
Alexander, Gadsden Co.
Rugel, between Tallahassee and St. Mark's, May and June, 1843.

The leaves of this plant are most variable in shape. In a specimen collected by Dr. Chapmam at Apalachicola, preserved in the herbarium of Columbia University, they are from 5–8 cm. long and from 1–2 cm. wide. This matches the figure given by Dunal of his *A. pygmaea*,* having the short straight ascending branches and the petals obovate and about 3 cm. long, just as there represented. In the extreme of variation, represented by Curtiss, no. 87 *, and Nash, no. 2153, the leaves are 8–20 cm. long, and only 5–15 mm. wide; the petals narrowly obovate and 5–6 cm. long. There are numerous plants connecting these two extremes; indeed, leaves nearly representing the two forms were noticed on the same plant by the writer during the past summer.

Another form of this plant has a flower terminating the branches and no flowers in the axils of the leaves. This is probably but a variation, and it seems best to refer it to this species. Dr. Small's plant, collected at Albany, Georgia, in May, 1895, well represents this form; as does also a specimen secured by Dr. Baldwin in the same State. This last is the type of the variety of *Uvaria pygmaea* mentioned by Torrey and Gray in their Flora of North America.*

---

* Monog. Anon. *pl. 10.* 1817.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE.—No. 96.

Notes on Potentilla.–I.–II.

BY P. A. RYDBERG.

[Reprinted from The Bulletin of the Torrey Botanical Club, Vol. 23, Nos. 6 and 7,
June and July, 1896.]

Notes on Potentilla.—I.

By P. A. Rydberg.

The author has been studying the genus *Potentilla* for some time. The plan is to prepare a revision of the North American Potentilleae and have it published as Volume 2 of the Memoirs from the Department of Botany of Columbia College. It is planned to contain, if possible, full-size illustrations of all native species of *Potentilla*, *Horkelia*, *Ivesia*, etc. The best way the author knows of to secure the coöperation of other botanists is to publish some of the results already obtained. He will regard it as a great favor to be permitted to look over and name any collection of North American species, and will be very thankful for any information, suggestion or criticism that may be given.

It will be seen from the following that my opinion as to the limitation of the species differs widely from those expressed in our manuals and from Dr. Watson's revision of *Potentilla* in the Proceedings of the American Academy of Arts and Sciences, **8**: 549–573. They agree, however, very closely with those held by the late Dr. Christian Lehmann, of Hamburg. This eminent botanist, after having studied the genus about forty years, having published several papers on it from time to time, among others a monograph in 1820, and having prepared the text for the genus *Potentilla* in Hooker's Flora Boreali-Americana, issued in 1856 his "Revisio Potentillarum," a quarto of 250 pages and 64 plates. This book, which always will remain as one of our standard works, will serve as the basis of my revision.

In the *glandulosa* group Dr. Watson includes only two species, viz., *P. arguta* and *P. glandulosa*. Lehmann acknowledged five American species. Of these five, *P. brevifolia* Nutt., must be excluded, as the style is not basal. For my part, I think the group contains at least seven or eight species. The additional species were not known to Lehmann, except *P. glutinosa* Nutt., which he included as a variety under *P. fissa* Nutt.

The group is characterized by an erect habit, more or less glandular pubescence, pinnate leaves with rounded or rhomboidal, coarsely toothed leaflets, obovate or obicular, not emarginate petals, very flat anthers, and a nearly basal style, this last character, as far as I know, not being found elsewhere in the genus. In all except one, the style is also fusiform, *i. e.*, swollen near the middle and tapering to both ends. The species belonging to the group are:

POTENTILLA ARGUTA Pursh, Fl. Am. Sept. 736. 1814.

Geum agrimonioides Pursh, Fl. Am. Sept. 351. 1814. Not *Potentilla agrimonioides* Bieb.

This is the only eastern species of the group, extending from New Brunswick to the District of Columbia, westward to the foothills of the Rocky Mountains, from Colorado, as far north as Fort Simpson, on the Mackenzie River. It differs from the rest by its pubesbence, which is coarser, densely hirsute and glandular, by its dense and strict cyme, and its white flowers. Dr. Watson mentions that in the Rocky Mountain region there is found a form of *P. arguta* with bright yellow flowers. This is probably a mistake, and the specimens referred to belong to the next species.

POTENTILLA GLUTINOSA Nutt; Torr. & Gray, Fl. N. Am. 1: 446. 1838. As a synonym under

P. fissa major Torr. & Gray, *l. c.* Not *P. verna major* Wahl.

P. arguta Nutt. Journ. Acad. Phil. 7: 21. 1834. Not Pursh, 1814.

P. valida Greene, Pittonia, 3: 20. 1896.

It most resembles *P. arguta* in habit, is fully as stout and as pubescent, but the pubescence is finer, the longer hairs villous rather than hirsute. The cyme is open in age, rather flat-topped, the pedicels longer, the sepals thinner and more acute, and the petals larger, much exceeding the calyx, and bright yellow. It ranges from Vancouver Island and British Columbia to Idaho and Oregon. A specimen also belonging here, without doubt, but less pubescent, has been collected in Utah by Marcus E. Jones. Fendler's no. 197, from Santa Fé Creek, New Mexico, which was included in *P. fissa major* by Lehmann, resembles the typical form except that the petals are smaller, scarcely exceeding the sepals.

POTENTILLA FISSA Nutt.; Torr. & Gray, Fl. N. Am. 1: 446. 1838.

P. glandulosa Am. Auth., not Lindley.

P. scopulorum Greene, Erythea, 1: 4. 1893.

The flowers resemble much those of the preceding, the petals being bright yellow, very large, orbicular, very concave, and much exceeding the ovate-lanceolate long-acuminate sepals; but the habit is very different. *P. fissa* is a low plant, seldom exceeding 2 dm. high, very bushy, with a narrow and few-flowered cyme; also often with some flowers in the axils of the leaves. The leaves most resemble those of the next, but the leaflets are generally more rounded and with stronger veins. The type specimens of *P. scopulorum* are less glandular than the original of *P. fissa*, but very glandular specimens have been collected even in Colorado. *P. fissa* occurs in the higher Rockies. It is common in Colorado, rare in Wyoming, Idaho and Montana.

POTENTILLA GLANDULOSA Lindl. Bot. Reg. 19: *pl. 1583.* 1833.

Resembles *P. glutinosa* in the open many-flowered cyme and general habit, but is a much more slender plant. It resembles *P. fissa* in the leaves, the long sepals and the shorter glandular pubescence, which is sometimes rather sparse. It differs from both by its petals, which are obovate, flat and about equal the sepals. Next to *P. arguta*, it is the most common and has the widest range of the group. It extends from British Columbia and Alberta to the Black Hills of South Dakota and the foot hills of New Mexico and California.

Suksdorf has collected a plant in West Klickitat Co., Wash., which agrees perfectly with *P. glandulosa*, except that the petals are very small, obovate-spatulate and white.

P. Hanseni Greene, Pittonia 3: 20, should perhaps be regarded as a mountain variety of *P. glandulosa* rather than a distinct species. It differs only in its more slender habit, a slightly denser pubescence, somewhat shorter sepals and a more contracted and few-flowered cyme, a modification perhaps due to the higher altitude. Intermediate forms are not rare. It is common in the higher Sierras of California, Nevada and Arizona.

POTENTILLA LACTEA Greene, Pittonia 3: 20. 1896.

P. glandulosa lactea Greene, Fl. Frans. 65. 1891.

I can not pronounce on this, as I have not seen specimens. The description points toward *P. glandulosa*, except in the color of the petals, which are described as white.

POTENTILLA WRANGELLIANA Fish. & All. Anim. Bot. Ind. Sem. Hort. Bot. Petrop. 1840: 54; Ann. Sci. Nat. (II.) 16: 57. 1841.

P. rupestris Presl, Epim. Bot. 198 1849. Not. L.

P. glandulosa Am. Auth., as Brewer & Wats. Bot. Cal. 1: 178, and Greene, Fl. Frans. 65, mainly.

This species most resembles *P. glandulosa*, but differs by the larger, more decidedly double-serrate leaflets, the more leafy cyme, which is dichotomously branched, with a short-pedicelled flower in the forks, but principally by the sepals, which are more veiny, oval (not ovate-lanceolate), and abruptly contracted into a small point, almost mucronate. The common form is inclined to become glabrate. Lindley's figure of *P. glandulosa incisa* in Bot. Reg. 23: *pl. 1973*, resembles this species as to the leaves, but the cyme and the sepals are those of *P glandulosa*. *P. Wrangelliana* is common in California and Oregon, extending into Washington.

P. Oregana Nutt. Mss., is a form of this species, but the stem is glandular and very pubescent with long villous hairs. Torrey and Gray Fl. N. Am. 1: 446, place it as a synonym of *P. glandulosa*, but its habit and sepals show a close relationship with *P. Wrangelliana*.

POTENTILLA REFLEXA Greene, Pittonia 3: 19. 1896.

P. glandulosa reflexa Greene, Fl. Frans. 65. 1891.

This somewhat resembles *P. glandulosa*. The principal difference given by Prof. Greene is that petals and sepals are reflexed in anthesis. As far as I know the species, the following characters may be added: thicker, darker leaves with broader and shorter teeth, a more slender stem which is inclined to be tinged with red, and a fruiting calyx scarcely larger than that of the next species. According to Prof. Greene, it is common in dry open pine woods of the foothills of the Sierra Nevada. I have seen specimens from only two collections, viz., Coville & Funston, no. 1355, from Big Tree Cañon, Southern California, 1891; and Mrs. R. M. Austin, Modoc Co., Calif., 1895.

POTENTILLA RHOMBOIDEA n. sp.

P. glandulosa var. *Nevadensis* Wats. Bot. Calif. **1**: 178, in part. 1876. Not *P. Nevadensis* Boiss.

Stem low and slender, about 2 dm. high, simple, about 3-leaved, not striate, nearly glabrous or glandular above, with very short hairs. Stipules small, 2–4 mm., ovate and subentire. Basal leaves many, short-petioled, about 3-paired, smooth or beset with a few scattered hairs. Leaflets rhombic-ovate, mostly acute, serrate with acute teeth, the largest ones 1½ cm., seldom 2 cm. long. Stem leaves about 3, similar, the lowest pinnate with about 2 pairs, short-petioled, the other two generally 3-foliolate and subsessile. Flowers few in open cymes, about 1 cm. in diameter. Calyx glandular with very short hairs, sometimes also with a few long hairs; sepals about 8 mm. long in fruit. Bractlets linear-oblong, obtuse or acutish, half the length of the broadly ovate slightly mucronate sepals. Petals yellow, obovate, a little exceeding the sepals. Stamens 15–20. Style nearly basal, filiform, long and slender, in fruit about twice as long as the smooth achene.

It somewhat resembles depauperate *P. glandulosa*, but differs by its longer filiform style, which is not fusiform, by the pubescence which could be called glandular-pruinose, when present, with a few scattered straight hairs on the calyx and the leaves, and by the small fruiting calyx. It reminds us also of *P. brevifolia*, but in the latter the style is not basal and the petals emarginate.

P. rhomboidea is apparently a rare plant. The following specimens have been seen by me:

Nevada, S. Watson; *Montana*, S. Watson, no. 114; *Washington*, W. V. Suksdorf (Mt. Paddo), 1885; *Oregon*, Thomas Howell (Deer Creek Mts.), no. 1128, 1887.

To this group belong also *P. geoides* Bieb. of Tauria, *P. rupestris* L. of Europe and northern Asia, and *P. macrocalyx* Huet du Pav. of the Pyrenees.

Notes on Potentilla.—II.

By P. A. Rydberg.

Another very natural group is that which clusters around *P. rivalis*. Watson acknowledged only three species, viz.; *P. supina*, *P. rivalis* and *P. Norvegica*. Lehmann has ten species, of which six are American. To these six should be added *P. Nicolletii* (*P. supina Nicolletii* Wats.), which is a fairly good species and also another, near *P. millegrana*, described in this paper.

The characters of the group are: an annual or biennial root, a terminal style which is curved above and considerably thickened near the base, small flowers, in which the petals seldom exceed the sepals, 5–20 stamens and small anthers whose two lobes are nearly spherical.

Potentilla paradoxa Nutt.; Torr. & Gray, Fl. N. Am. 1: 437. 1838.

P. supina Michx. Fl. Bor. Am. 1: 304. 1803. Not L.

It has been regarded as a form of the European *P. supina*, and we still find it under that name in our manuals, notwithstanding the fact that the principal distinction has been known since the time of Nuttall. It resembles *P. supina* in the leaves, which are pinnate with several pairs of leaflets, but differs from it not only by the swollen corky attachment of the achene, but also in the stouter and more upright habit, the larger and coarser leaflets and a truly cymose inflorescence. It ranges from New York to Montana and New Mexico.

POTENTILLA NICOLLETII (Wats.) Sheld. Bull. Geol. and Nat. Hist Surv. Minn. 7: 16. 1894.

P. supina Nicolletii Wats. Proc. Am. Acad. **8**: 553. 1873.

This is much nearer the European *P. supina*, having the same prostrate habit, small leaflets and falsely racemose inflorescence, but the achenes are of the same structure as in *P. paradoxa*. Only the basal leaves have several more or less distant pairs of leaflets; the lower stem-leaves have generally two approximate pairs, and the rest are ternate. It is a rather rare plant. The following specimens have been examined:

Minnesota: C. A. Geyer (Nicollet's Exped.), no. 361, 1838 (type); *Missouri*: B. F. Bush, 1893; *Iowa*: Hitchcock.

POTENTILLA RIVALIS Nutt.; Torr. & Gray, Fl. N. Am. 1: 437. 1838.

This differs from the preceding by its upright habit, cymose inflorescence, small petals which are scarcely half as long as the sepals, and achenes without any swelling on the inner side. The leaves are generally pinnate with two pairs of approximate leaflets, except the upper ones, which are ternate. Occasionally, especially in depauperate specimens, all the leaves are ternate, when it is very difficult to separate it from the next. The range is from Oregon and Montana to Mexico. All specimens named *P. rivalis* I have seen from the prairie States, except one from the stock-yards of Chicago, belong to the following species:

POTENTILLA MILLEGRANA Engelm.; Lehmann, Ind. Sem. Hort. Bot. Hamb. **1849**: Add. 11. 1849.

This, as well as *P. pentandra*, have been regarded as varieties of the preceding. I think it is better, however, to consider them species. In *P. millegrana* all the leaves are, as a rule, ternate. The plant is much branched, with divergent branches and in the typical form spreading. This habit and the smaller, nearly white achenes separate it from forms of *P. rivalis* with ternate leaves. The plant is generally also more glabrate. It has a wide range, but is not a common plant. It extends from Illinois to New Mexico, California and Washington.

POTENTILLA LATERIFLORA n. sp.

P. millegrana lateriflora Engelm. Mss. in herbarium.

Annual or biennial; stems often several from the root, 3–5 dm. high, terete, finely and rather densely glandular-pubescent, often tinged with red or purple, simpler than in related species and with erect branches. Stipules small, ovate or oblong, entire or toothed. Leaves all ternate, the lower on petioles 2–10 cm. long, more or less hairy; leaflets broadly obovate, coarsely crenate, 2–4 cm. long and 1–3 cm. wide. Flowers small, about 5 mm. in diameter, on pedicels 5–15 mm. long from the axils of upper leaves, making the branches resemble leafy racemes. Calyx glandular-pubescent in fruit, about ½ cm. in diameter. Bractlets ovate-lanceolate or oblong, acute, a little shorter than the ovate, acute sepals. Petals yellow, obovate-cuneate, sometimes slightly emarginate, shorter than the sepals. Stamens about 10; pistils very numerous; style terminal, thickened and glandular at the base; ripe achenes whitish, smooth.

It most resembles *P. millegrana* and generally bears that name in our herbaria. Sometimes it is labelled *P. Norvegica*, which it resembles in the form of the leaf and general habit, but is a much more slender plant and has much smaller petals and fruiting calyx. From *P. millegrana* it differs in the simpler and erect stems, erect branching, falsely racemose inflorescence, broader and more hairy leaflets, and more glandular stems. Most specimens of what has been regarded as *P. rivalis millegrana* from the Pacific States belong to this species. It ranges from California and British Columbia to Assiniboia and Arizona. The following specimens have been examined:

Utah: Henry Engelmann (Simpson's Exp.), 1859.

Arizona: Edw. Palmer, no. 143, 1877; E. O. Wooton, 1892.

Nevada: Watson (King's Exp.), no. 324, 1867, in part, viz.: specimens from Unionville.

California: Coville & Funston, no. 1763, 1891: Wilkes' Expedition, no. 1647; J. G. Lemmon, no. 85, 1875; S. B. Parish, no. 3153, 1894; M. E. Jones, no. 2700, 1881.

Oregon: J. H. Bartholf, no. 29, 1875; T. J. Howell, 1881.

Idaho: A. Isabel Mulford, 1892.

Montana: Mrs. Moore, 1894; P. A. Rydberg, 1895.

British Columbia: John Macoun, 1889.

Assiniboia: John Macoun, no. 10482. 1895.

POTENTILLA MONSPELIENSIS L. Sp. Pl. 499. 1753.

P. Norvegica L Sp. Pl. 499. 1753.
P. hirsuta Michx. Fl. Bor. Am. 1: 303. 1803.
P. Norvegica and *P. Norvegica hirsuta* Am. auth.

This is the stoutest of the group. It differs from the related species with ternate leaves in the size of the petals and the fruiting calyx. The former about equal the sepals in length and the latter often becomes 1 cm. in diameter. It is also more coarsely hirsute. It extends from Labrador to the District of Columbia westward across the continent.

The European form has generally a finer pubescence and oblong rather than obovate leaflets. It is occasionally met with in the East.

Potentilla Labradorica Lehmann, Ind. Sem. Hort. Bot. Hamb. 1849, Add. 12, has generally been included in *P. Monspeliensis*. From Lehmann's description it seems quite distinct, differing in being very low, 1–3-flowered, nearly glabrous, with leaves resembling those of *P. nana*, large stipules and larger flowers. I have not seen specimens.

POTENTILLA PENTANDRA Engelm; Torr. & Gray, Fl. N. Am. 1: 447. 1838.

P. pentandra is characterized by its leaves, which are digitately 5-foliolate or 3-foliolate, with the lateral leaflets cleft to near the base, by the exceeding numerous small flowers in a somewhat flat-topped cyme, by exceedingly small petals and generally only five stamens. It is often as stout as *P. Monspeliensis* and more bushy. Its range is from Missouri and Iowa to North Dakota and Arkansas.

The group *Multifidae* are perennials and have pinnate leaves with 2–7 pairs of deeply incised or pinnatifid leaflets, which are more or less white-tomentose beneath and greener above. All American species have a short terminal style, which in all except *P. pinnatifida* is thickened and glandular near the base. All except *P. Pennsylvanica* are spreading or ascending, with several stems from the perennial root.

POTENTILLA PENNSYLVANICA L. Mant. 1: 76. 1767.

P. Missourica Schrad. Linnaea, **8**: Litb. 26. 1833.

There is some doubt whether this or the next is the true *P. Pennsylvanica* L. The description of the leaves seems to indicate rather the next species. The form represented by *P. Missourica* has been cultivated in Europe under the name of *P. Pennsylvanica.* The same form was also figured by Jacquin, in his Hort. Vind. **2**: *pl. 189*, under that name. Dr. Lehmann held that Jacquin's figure represented the typical Linnaean species. Torrey and Gray, in Fl. N. Am., regarded *P. Missourica* as a synonym of the typical *P. Pennsylvanica.* I have therefore accepted that name for this very variable species.

P. Pennsylvanica is generally erect, 4–8 dm. high and more or less woolly tomentose. The leaves are truly pinnate, with 3–7 pairs of leaflets, which in the typical form are grayish tomentose beneath and nearly glabrous above, with broad oblong divisions and scarcely revolute margins.

The typical *P. Pennsylvanica* is a comparatively rare plant, ranging in British America from Hudson Bay to the Rockies, and in these extends southward to Colorado.

POTENTILLA PENNSYLVANICA BIPINNATIFIDA (Dougl.) Torr. & Fl. N. Am. 1: 438. 1838.

Potentilla bipinnatifida Dougl.; Hook. Fl. Bor. Am. 1: 188. 1830.

Segments linear, but their margins scarcely revolute; leaves white-tomentose beneath, more or less silky above.

It is more common than the species and of nearly the same range, but extends into Upper Michigan and Minnesota.

POTENTILLA PENNSYLVANICA STRIGOSA Pursh, Fl. Am. Sept. 356 1814.

Stem with spreading hairs; segments narrow and with more or less revolute margins.

This is the most common form of *P. Pennsylvanica* found in the same range as the species, but also extending over the plains to Kansas and New Mexico. Also in northern Asia.

POTENTILLA PENNSYLVANICA ARACHNOIDEA Lehm. Nov. Stirp. Pug. : 41. 1851.

Plant in every part smaller; segments short; stem arachnoid-pubescent. Colorado, Utah and New Mexico.

POTENTILLA PENNSYLVANICA GLABRATA Wats. Proc. Am. Acad. 7: 554. 1872.

Low, stem puberulent or glabrate; leaves nearly glabrate and the sepals more distinctly veined. Perhaps distinct. Nevada, Montana and Assiniboia, in the higher mountains.

POTENTILLA LITORALIS.

Stem decumbent or ascending, 2–4 dm. long, simple, slightly appressed silky strigose. Lower stipules lanceolate, scarious and brown, the upper ovate, green, more or less toothed. Leaves pinnate, of two approximate pairs of leaflets, the lower pair the smaller, or subdigitately 5-foliolate, grayish tomentose and veiny beneath, nearly smooth above. Leaflets obovate, divided to near the mid-rib into linear oblong obtuse divisions. Calyx strigose and slightly tomentose, in fruit about 8 mm. in diameter. Bractlets lanceolate-oblong, nearly equalling the ovate triangular sepals. Petals obovate, cuneate, truncate or slightly emarginate, about equalling the calyx; stamens 20–25; style short, terminal, thickened and glandular at the base; achenes smooth.

A near relative of *P. Pennsylvanica*, but differs in the ascending or spreading stem, the sparser pubescence, the leaves, which have fewer and approximate leaflets, often almost digitate, and the sepals which are more distinctly ribbed. *P. litoralis* is principally a beach plant, or at least growing near the coast, while *P. Pennsylvania* is an inland plain or mountain plant. The following specimens belong to *P. litoralis :*

New Hampshire: Oakes & Robbins (Isle of Shoals), W. M. Canby. *Maine:* Wm. Boott (Cape Elizabeth), M. L. Fernald. *Newfoundland:* Waghorne, no. 8, 1895. *Quebec:* J. A. Allen, 1881 (Shores of St. Lawrence). *Labrador:* J. A. Allen, 1882.

POTENTILLA MULTIFIDA L. Sp. Pl. 496. 1753.

This is a species which somewhat resembles *P. Pennsylvanica bipinnatifida*, but the plant is spreading or ascending, the leaves of only 2–3 pairs, their segments nearly filiform with revolute margins, the stipules long-acuminate, scarious and brown, the sepals narrower and the style not thickened and glandular at the base. It is not rare in northern and alpine Europe and Asia, but I have seen only the following specimens from America.

Great Slave Lake: Miss E. Taylor, 1892. *Hudson Bay*: R Bell, 1880.

POTENTILLA PULCHELLA R. Br. Ross' Voy. Ed. 2, 2: 193.

P. pulchella is generally a very small plant, tufted with many spreading items from the perennial root. The stems are generally less than 1 dm. long, but in one specimen seen fully 3 dm. The leaves have only two pairs of leaflets, and the terminal leaflet is generally sessile. It is generally quite hairy with long and yellowish white hairs. In general habit and flowers it comes near *P. Vahliana*, which has been mistaken for it; but the latter has always only 3 leaflets. Spitzbergen, Greenland, arctic coast of America, and Wrangle Island, off the coast of eastern Siberia.

POTENTILLA SOMMERFELTII Lehm. Del. Ind. Sem. Hamb. 1849: 6. 1849.

Closely resembles *P. pulchella*, but is still smaller and differs in the smaller flowers, the lack of the long hairs, and the stalked terminal leaflet. It is a native of Spitzbergen and Greenland, but one specimen at least has been collected on the American Continent. It was sent to Dr. Torrey from Dr. Hooker, but the collector's name does not appear on the label.

CONTRIBUTIONS FROM THE HERBARIUM OF COLUMBIA COLLEGE.—No. 97.

A Neglected Species of Oxalis and its Relatives.

BY JOHN K. SMALL.

[Reprinted from The Bulletin of the Torrey Botanical Club, Vol. 23, No. 7, July, 1896.]

A neglected Species of Oxalis and its Relatives.

By John K. Small.

The problem of drawing satisfactory lines between several species of *Oxalis* belonging to the group of which *O. corniculata* may be taken as the type, has apparently never been solved. Several forms of *Oxalis* exist in eastern North America, whose dispositions in our systematic works many botanists have not been able to understand satisfactorily. The plants referred to in this particular case are close relatives of *Oxalis corniculata* L., and have usually been regarded by authors as forms or varieties of that species, but as often happens, the " forms " or " varieties " possess excellent specific characters which for one reason or another have been overlooked.

A study of the material in the herbaria of Mr. Eugene P. Bicknell and Columbia University, together with field observations during several seasons, have led me to the following conclusions;

There are two perfectly distinct species, native in eastern North America, which have been indiscriminately referred to the names *Oxalis corniculata* or *O. stricta*. *Oxalis corniculata* is thought to be a native of southern Europe or tropical America and appears to be circumtropical. It is introduced to some extent into temperate regions, and we know it as a common weed in some of our southern cities; normally it is a prostrate and creeping plant, commonly wiry and very characteristic in habit, quite distinct from its two native eastern North American relatives with which we are at present concerned.

Linnaeus defines* *O. corniculata* and *O. stricta*, giving as characters for the former; "caule ramoso diffuso, pedunculis umbelliferis, Hort. Cliff. 175" and Trifolium luteum minus repens etjam procumbens, Moris. hist. 2, p. 183, f. 2. t. 17. f. 2." For *O. stricta* he gives, "caule ramoso erecto, pedunculis umbelliferis, Gron. Virg. 161," and "Trifolium . . . corniculatum luteum majus rectum . . . , Moris. hist. 2, p. 184, f. 2. t. 17. f. 3." We notice that Linnaeus describes the habit of the two species as dissimilar, while the character of the inflorescence is recorded as the same in both, namely, "pedunculis umbelliferis."

What strikes one most forcibly in the case of our two eastern species is the great difference in the general habit of the plants and their more minute morphology; the lower stout and pale plant with umbel-like inflorescence, large columnar abruptly pointed pods and strigose pedicels is closely related to *Oxalis corniculata* although abundantly distinct. Its characters pointed to the Linnaean *O. stricta*, but to make sure, specimens of both the eastern American forms were sent to Mr. Edmund Baker, who kindly compared them with the originals in the herbarium of the British Museum of Natural History and reported that the plant with umbel-like inflorescence matched the original of *Oxalis stricta*.

This disposes of one species, but there now remains the plant which has posed as *Oxalis corniculata*, as a state of *O. corniculata*, as a variety of *O. corniculata* and as *O. stricta*; it is tall and slender in habit and of a bright green color, with cymose inflorescence, smaller and more gradually narrowed capsules and villous pedicels I cannot find an available published name for this species, and the only indication that it was noticed many years ago is the figure 4, on plate CCXXI, of Dillenius' Hortus Elthamensis, the rest of the plate clearly being *Oxalis stricta*. This species may be designated *Oxalis cymosa*. I append a description of our two common species:

OXALIS STRICTA L. Sp. Pl. 435. 1753.

Annual, caulescent, normally low, stout, fleshy, pale-green, glabrous below, or more or less strigose. Stem simple and erect or usually branched at the base, the branches spreading, decumbent or ascending, 1–4 dm. long, rather fleshy, usually green; leaves 1.5–3.5 cm. in diameter, on petioles 3–9 cm. long; stipules a narrow scarious dilatation of the base of the petiole; leaflets broader than long, thick and fleshy, acutely notched at the apex, the cellular structure very prominent under a lens; inflorescence axillary, umbellate; peduncles rather stout, 4–15 cm. long; petioles 1–2.5 cm. long, strigilose, at length deflexed, subtended by linear-subulate bracts; flowers yellow, fragrant; sepals linear or lanceolate, about 5 mm. long, many-nerved, ciliolate, erect or ascending; petals somewhat spatulate, about 1 cm. long, many-nerved, more or less inequilateral, undulate, commonly reddish at the base, sometimes slightly emarginate at the apex; capsule columnar, 1.5–3 cm. long, abruptly narrowed at the apex; seeds obovoid or elliptic, about 1 mm. long, brown, angled, marked with interrupted transverse ridges, the base rather acute.

---

* Sp. Pl. 435.

New England to Dakota and Colorado, south to the Gulf of Mexico.

OXALIS CYMOSA n. sp.

Annual, caulescent, normally tall, slender, rather wiry, bright-green, glabrous or somewhat villous. Stem simple at the base, more or less branched above, 1–7 dm. tall, erect or assurgent, rarely decumbent at the base, at length woody, somewhat grooved, reddish or brownish; leaves 1–5 cm. to usually 3 or 4 cm. in diameter, on slender petioles 3–7 cm. long; stipules almost wanting; leaflets broader than long, acutely notched at the apex, usually thinnish, the cellular structure not prominent under a lens; inflorescence axillary, cymose; peduncles wiry or filiform, 5–10 cm. long; pedicels 5–8 mm. long, villous, erect or ascending, subtended by linear-lanceolate bracts; flowers yellow; sepals lanceolate or narrowly elliptic, 4–5 mm. long, obtuse or acutish, erect or at length spreading; petals obovate or somewhat spatulate, 7–9 mm. long, many-nerved, obtuse or emarginate at the apex; capsule columnar, 1–1.5 cm. long, gradually narrowed to the apex; seeds obovoid-oblong, 1.2 mm. long, marked with prominent continuous ridges.

Ontario to the Lake Superior region and Nebraska, south to the Gulf of Mexico. Flowers somewhat earlier than *O. stricta*.

There is another relative of *Oxalis corniculata* occurring in our campestrian territory that appears to need study. I have examined the plant in the field and in the herbarium during several years and am convinced that it is specifically distinct from all other forms.

Rafinesque apparently found this form many years ago and described it in his New Flora,* and Prof. Trelease has described† it as a probable variety of *Oxalis corniculata*. The following is a description of the species as I now know it.

---

* New Fl. 2:27. 1836,

† Mem. Bost. Soc. Nat. Hist. 4: 88. 1888.

OXALIS MACRANTHA (Trel.).

?*Oxalis caespitosa* Raf. New. Fl. 2: 27. 1836. Not A. St. Hill.

Oxalis corniculata var.? *macrantha* Trel. Mem. Bost. Soc. Nat. Hist. 4: 88. 1888.

Usually perennial by horizontal rootstocks, stoutish or hirsute. Stems erect or assurgent, sometimes loosely tufted, 1–3 dm. tall, often becoming woody at the base, commonly leafy throughout, sometimes densely hirsute; leaves 1 cm. or usually 2–3 cm. broad, more or less silky-pilose; petioles filiform, 3–9 cm. long, pubescent like the stem; leaflets ciliate, sharply notched at the apex; peduncles filiform, exceeding the petioles; flowers bright yellow or golden, 2–2.5 cm. broad, 2–5 umbel-like at the ends of the peduncles; pedicels 1–2 cm. long, about as long as the flowers, subtended by linear-subulate bracts; sepals ovate or oblong, 6 mm. long, obtuse, minutely pubescent, 6–12 nerved, nearly erect, the tips sometimes spreading, petals nearly 1.5 cm. long, slightly notched at the apex; ovary glabrous or nearly so; styles villous; capsule columnar, 12 mm. long, abruptly narrowed into and tipped by the long (4–5 mm.) styles; seeds obovoid, 3-angled, 1.5 mm. long, marked with low broken transverse ridges.

Missouri to Georgia, Florida and Texas; ascends to only a few meters above sea-level.

CONTRIBUTIONS FROM THE HERBARIUM OF COLUMBIA COLLEGE.—No. 98.

Studies in the Botany
—of the—
Southeastern United States.—VI.

BY JOHN K. SMALL.

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 23, No. 8, August, 1896.]

Studies in the Botany of the southeastern United States.—VI.

By John K. Small.

Ribes curvata n. sp.

Perennial, glabrate, bright green, armed with subulate spines, which are about 4–6 mm. long. Stem diffusely branched throughout, 6–8 dm. long, clothed with a loose papery exfoliating bark; branches purplish; branchlets reddish, wiry, like the branches recurved, or conspicuously drooping; leaves suborbicular, 1–2 cm. in diameter, three-lobed, the lobes toothed, the terminal lobe often mucronate; petioles slender, as long as or shorter than the blade of the leaf, usually somewhat villous; flowers small but conspicuous, solitary; peduncles 7–8 mm. long; pedicels twisted, nearly as long as the peduncles, subtended by two 3-lobed ciliate bractlets; calyx-tube papillose; calyx-segments linear or linear-spatulate, 6 mm. long, whitish, reflexed and recurved, strongly nerved toward the middle, the edges hyaline, obtuse, one usually notched at the apex; petals oblong, 1.5 mm. long, white, obtuse, with lateral teeth and one or two nerves; stamens conspicuous, 7 mm. long, erect; filaments villous; anthers red; style somewhat shorter than the filaments, villous; berry globose, 6–8 mm. in diameter, crowned by the persistent stamens.

A low, diffuse shrub, growing on the slopes of Stone Mountain, Georgia; found in flower during the first two weeks of May, and in fruit in the first week of July, 1895.

Cuphea procumbens Cav. Ic. 4: 55. *pl. 380.* 1797.

Mr. A. M. Huger has sent me specimens of this showy *Cuphea* from naturalized plants found at Horse Cove, Macon county, North Carolina, altitude about 800 meters. The plant has escaped from gardens.

Perilla frutescens (L.) Britton, Mem. Torr. Club, 5: 277. 1894.

This garden plant is establishing itself along the roadsides in the foothills of the mountains of Georgia, notably between Toccoa Falls and Tallulah Falls.

THE NORTH AMERICAN SPECIES OF ILYSANTHES.

Field experience with *Ilysanthes* convinces me that the genus has never been correctly understood. The botanists of the early part of this century seem to have limited the species much better than later authors. Among the later botanists Dr. Chapman* has given us the most satisfactory interpretation of the genus, but he makes *I. gratioloides* a composite. Dr. Gray's treatment in the Synoptical Flora† is inferior in that it contains the composite species just mentioned, and reduces *I. saxicola*, a clearly distinct species, to a variety or state of *I. refracta*. The following seems to me to be the proper division of the genus:

Key to the Species.

Stems creeping, leafy throughout; leaves orbicular or orbicular-ovate, all sessile, rounded at the base.
  Leaves entire; upper lip of the corolla much shorter than the lower; capsule slender, much shorter than the calyx. 1. *I. grandiflora.*
  Leaves 3-toothed; upper lip of the corolla about equalling the lower; capsule stout, equalling or slightly exceeding the calyx. 2. *I. tridentata.*
Stems erect or ascending, not creeping; leaves more or less elongated, the lower ones usually narrowed at the base.
  Pedicels shorter than the leaves; calyx-segments commonly as long as or longer than the capsule. 3. *I. attenuata.*
  Pedicels longer than the leaves; calyx-segments shorter than the capsule.
    Leaves slightly reduced above; pedicels ascending or spreading.
      Upper leaves more or less clasping; capsules much longer than the calyx-segments. 4. *I. gratioloides.*
      Upper leaves not at all clasping; capsules slightly longer than the calyx-segments. 5. *I. saxicola.*
    Leaves reduced to narrow inconspicuous bracts above; pedicels reflexed. 6. *I. reflexa.*

1. **Ilysanthes grandiflora** (Nutt.) Benth. in DC. Prodr. 10: 418. 1846.

Lindernia grandiflora Nutt. Gen. 2: 43. 1818.

---

* Fl. S. States, 294.

† Syn. Fl. 2: Pt. 1, 283.

Annual, slender, glabrous, somewhat fleshy, bright green. Stems decumbent and creeping, leafy throughout, 2–20 cm. long, simple or rarely branched; leaves suborbicular, .5–1 cm. in diameter, leathery, entire, usually obtuse, sessile, rounded at the base, more or less clasping; pedicels filiform, 2–4 cm. long, several times longer than the leaves; calyx-segments linear-lanceolate, 3 mm. long, acute, about as long as the capsule; corolla blue, slender, about 1 cm. long, its upper lip much shorter than the lower; capsule slender, narrowly oblong, or narrowly ovoid, 4.5–5 mm. long, acute or acuminate, much longer than the calyx.

Low wet places, eastern Georgia and Florida, March to October. Ascends only a few meters above sea level.

2. ILYSANTHES TRIDENTATA n. sp.

Ilysanthes grandiflora S. Wats. Proc. Am. Acad. 22: 442. 1896. Not Benth. 1846.

Annual or biennial, fleshy, slender, glabrous. Branches erect or ascending from a rhizome-like creeping stem, simple or sparingly branched, leafy throughout; leaves orbicular-ovate, 4–6 mm. long, with two low teeth below the apex, rounded at the base, sessile or sometimes slightly clasping, rather densely punctate; pedicels filiform, 1.5–2 cm. long, ascending; calyx minutely glandular-puberulent, its segments linear, 2.5–3 mm. long, obtuse, more than twice shorter than the corolla; corolla stout, 10–12 mm. long, its upper lip very slightly crisped, nearly as long as the cleft and slightly involute lower one; capsule oblong-obovoid, 3–3.5 mm. long, obtuse, equalling or slightly longer than the calyx; seeds oblong or obovoid, angled, with a minute tubercle at the summit.

Rio Blanco, Jalisco, Mexico (Palmer, 46). June to October.

3. ILYSANTHES ATTENUATA (Muhl.).

Lindernia attenuata Muhl. Cat. 59. 1813.

Lindernia pyxidaria var. *major* Pursh, Fl. Am. Sept. 419. 1814.

Gratiola attenuata Spreng. Syst. 1: 39. 1825.

Ilysanthes gratioloides curtipedicellata Bush, Bull. Torr. Club, 21: 494. 1894.

Annual, low, fleshy, glabrous, dull-green. Stem erect or ascending, 1–5 dm. long, the branches often numerous, spreading; leaves oblong or ovate, sometimes oblanceolate, or obovate, 1–3 cm. long, thinnish, obtuse, distantly and shallowly serrate, five-nerved, gradually narrowed into a short petiole, or the upper ones nearly sessile; pedicels rather stout, shorter than the leaves; calyx-segments linear-subulate, as long as or longer than the capsules;

corolla 4–11 mm. long; capsule narrowly ovoid, about 4 mm. long; pointed, tipped by the persistent style; seeds oblong, slightly curved, .3–.4 mm. long, yellowish-brown, transversely wrinkled, with usually rounded ends.

Wet places, Ontario to Wisconsin and Missouri, south to the Gulf of Mexico. March to October. Ascends to about 670 meters in the mountains of Virginia.

My attention was first called to this plant by Mr. Bush's Missouri specimens (described as *I. gratioloides curtipedicellata*) and by some I collected in North Carolina. On taking up the subject I found no lack of material, there being twenty-two specimens in the Herbarium of Columbia University variously associated with twenty-five specimens of *I. gratioloides*, some even over the same label. *I. attenuata* can be distinguished from *I. gratioloides* at sight by its stouter and lax habit and short pedicels, while a closer examination will show the calyx-segments of the former as long as or longer than the capsule, whereas those of the latter are always much shorter than the capsule.

4. ILYSANTHES GRATIOLOIDES (L.) Benth. in DC. Prodr. 10: 419. 1846.

Capraria gratioloides L. Sp. Pl. Ed. 2, 876. 1763.
Gratiola anagallidea Michx. Fl. Bor. Am. 1: 5. 1803.
Lindernia dilitata anagallidea Muhl. Cat. 59. 1813.
Lindernia pyxidaria Pursh, Fl. Am. Sept. 419. 1814.
Ilysanthes riparia Raf. Ann. Nat. 13. 1820.
Gratiola dilatata Muhl.; Spreng. Syst. 1: 39. 1825.
Ilysanthes attenuata Raf.; Benth. in DC. Prodr. 10: 419. 1846. Not *L. attenuata* Muhl.
Ilysanthes dilitata Raf.; Benth. in DC. Prodr. 10: 419. 1846.

Annal, low, wiry, glabrous, bright green. Stem erect, or at length decumbent, 1–2 dm. long, simple or diffusely branched from near the base; leaves ovate, or the lower oblong or obovate, somewhat leathery, .6–2 cm. long, obtuse or acute, entire or nearly so, indistinctly nerved, sessile, abruptly narrowed at the base (except some of the lower ones), obtuse or subcordate; pedicels wiry, much longer than the leaves; calyx-segments linear, shorter than the capsule; corolla 5–7 mm. long; capsule ovoid, 4–5 mm. long, rather blunt, tipped by the persistent style; seeds oblong, .2 mm. long, nearly straight, reddish, transversely wrinkled, with usually square ends.

Damp places, New England to Dakota, Nebraska and Texas, south to the Gulf of Mexico, across the southern boundary of the United States and on the Pacific coast; also in Cuba, and said to occur in Mexico. July to September. Ascends to 100 meters both in the Eastern and Pacific States.

Ilysanthes gratioloides has a more extensive geographic distribution than any other of our species. It ranges over the whole United States, except a part of the Rocky Mountain region, although further exploration may show its existence there. It is said to be native in South America and eastern Asia and to be naturalized in western Europe. I have not seen foreign specimens.

5. ILYSANTHES SAXICOLA (M. A. Curtis) Chapm. Fl. S. States, 290. 1860.

? Lindernia monticola Muhl. Cat. 59. Without description. 1813.

Lindernia saxicola M. A. Curtis; Am. Journ. Sci. **44**: 83. 1843.

Ilysanthes refracta var. *saxicola* A. Gray, Syn. Fl. N. A. **2**: pt. 1, 283. 1878.

Annual or sometimes biennial, glabrous, slender, but somewhat fleshy, bright green. Stems solitary or tufted, erect or assurgent, 2–20 cm. long, simple, or sparingly branched, especially above; leaves fleshy-leathery, 0.5–1.5 cm. long, the basal tufted, spatulate, obtuse, commonly very short-petioled, the upper ones ovate, lanceolate or narrowly elliptic, acutish, sessile, not clasping, slightly narrower than the lower; pedicels wiry, but rather stout, ascending or spreading, 1–1.5 cm. long, 3–4 times longer than the leaves; calyx-segments linear-lanceolate, acutish or obtuse, 2 mm. long, slightly shorter than the capsule; corolla pale blue, variegated, about 1 cm. long, its segments crisped; capsule ovoid, 3 mm. long, rather obtuse; seeds globose-oblong, 0.5 mm. long, pale.

Crevices in damp rocks, Tallulah Falls, Georgia, and on the Hiwassee River, North Carolina. At about 460 meters at Tallulah Falls, and probably at a little greater altitude in North Carolina.

6. ILYSANTHES REFRACTA (Ell.) Benth. in DC. Prodr. **10**: 419. 1846.

Lindernia refracta Ell. Bot. S. C. and Ga. **1**: 579. 1817.

Lindernia monticola Nutt. Add. 1818.

Annual or biennial, glabrous, very slender and wiry, bright green. Stems several together or densely tufted, erect or ascending, .8–3 dm. long, at length almost filiform, nearly naked, simple or sparingly branched and finally diffuse; leaves mostly basal, spatulate or obovate, 1–3 cm. long, obtuse, entire or undulate, sessile or narrowed into a short petiole; stem leaves reduced to narrow inconspicuous bracts, except a pair at the first or second node; pedicels filiform, at length reflexed, 2–4 cm. long; calyx-segments almost linear, 2–3 mm. long, acutish, twice shorter than the capsule; corolla 1–1.3 cm. long, its segments flat; capsule linear-oblong, about 4 mm. long, acute or acutish; seeds globose-oblong, .5 mm. long, orange, with a small tubercle at the end.

Mostly on wet rocks, North Carolina to Mississippi, south to Florida. Spring to Fall. Ascends to about 365 meters on Little Stone Mountain, Georgia.

GAYLUSSACIA URSINA (M. A. Curtis) T. & G.; A. Gray, Mem. Am. Acad. (II.) 3: 49. 1846.

Flowering specimens of this rare huckleberry were collected by Mr. A. M. Huger, in the mountains about Highlands, Macon county, North Carolina, June, 1895. The altitude was about 710 meters.

SOLIDAGO PURSHII Porter, Bull. Torr. Club, **21**: 311. 1894.

"* * * Two remarkable southern stations * * *," namely McCalls Ferry, Pennsylvania, and Great Falls of the Potomac, are mentioned in the Synoptical Flora as localities for this northern *Solidago*.

In the latter part of August, 1894, I was surprised to find handsome specimens growing in crevices of the rocks at the bottom of the cañon at the falls of the Yadkin river, and at the Narrows some miles above the falls in middle North Carolina. The plants differ from specimens from the northern localities in their greater size and glabrous achenes. There is an abundant growth during the last part of August and the first weeks in September, but at other seasons hardly a vestige of the species can be found. The average height of the plants is about three feet; a few specimens attained a height of four feet. At these localities the species is more plentiful and attains a greater development than it does at the northern stations.

SOLIDAGO GRACILLIMA T. & G. Fl. N. A. **2**: 215. 1841.

In September, 1894, I found this species on the summit of Little Stone Mountain, Georgia. Heretofore it has been known only from middle Florida, from collections by Dr. Chapman.

SOLIDAGO RADULA Nutt. Journ. Acad. Phila. 7: 102. 1834.

Found for the first time east of the Alleghenies on August 18th, 1891, by Mr. Heller and myself growing on dry hillsides, just west of the Falls mountains, Stanley county, North Carolina, and observed for several succeeding years. This is an interesting addition to the eastern flora.

HELIANTHUS OCCIDENTALIS Riddell, Suppl. Cat. Ohio Pl. 13. 1836.

This prairie species occurs in a meadow near Logansville, Georgia, about twenty-five miles east of Atlanta. This seems to be the first record of its occurrence east of the Blue Ridge.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE.—No. 99.

Notes on Potentilla.—III.

BY P. A. RYDBERG.

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 23, No. 8, August, 1896.]

Notes on Potentilla.—III.

By P. A. Rydberg.

With the exception of two species, viz., the white-flowered *P. tridentata* Soland., and the introduced *P. nemoralis* Nestl., all the North American perennial species with ternate leaves can be divided into two natural groups, viz., the *Niveae*, with leaves densely white-tomentose beneath, and the *Frigidae*, without tomentum. Both groups consist of plants generally less than 2 dm. high and often more or less caespitose. The style is terminal or nearly so, filiform but short, in all, except *P. flabellifolia*, not longer than the mature achenes. All the species are arctic or alpine.

To the *Niveae* belong the following:

Potentilla villosa Pall.; Pursh, Fl. Am. Sept. 353. 1814.

P. fragiformis villosa Regel & Tiling, Fl. Ajan. 85.

Watson follows Regel & Tiling in placing *P. villosa* as a variety under *P. fragiformis*. The two resemble each other in one important character, viz., the broadly oval obtuse bractlets, which, as well as the calyx, enlarge considerably in fruit. *P. villosa* differs from *P. fragiformis*, however, in the leaves as well as in the flowers; those of the former are much thicker, densely silky above (rarely glabrate), and densely floccose and with prominent veins beneath. The flowers are about one-half larger than those of *fragiformis*. From all the species of the group it differs in the large 2-3 cm. wide flowers, stout habit, large leaves and broad bractlets. *P. villosa* is a native of Alaska and adjacent Asia, but is also found in the mountains of British Columbia, Vancouver Island and Washington.

POTENTILLA HOOKERIANA Lehm. Ind. Sem. Hort. Bot. Hamb. 1849: Add. 10. 1849.

Dr. Watson placed this with *P. Pennsylvanica* on account of the style. It is glandular, but scarcely thickened near the base, and not curved as in *P. Pennsylvanica.* In habit it comes nearest to *P. nivea*; and as the style is often glandular in *P. villosa* and sometimes in *P. nivea*, it is better to include *P. Hookeriana* in this group, with which it agrees in all other respects. It differs from *P. nivea* in the more deeply dissected leaves, the smaller flowers, the bractlets, which equal the sepals, and a slightly stricter habit. It is a very rare plant.

POTENTILLA NIVEA L. Sp. Pl. 499. 1753.

The common form of this species is fully as tall as either of the two preceding, but very slender. The flowers are only 15 mm. in diameter, the bractlets linear-oblong or lanceolate, shorter than the ovate-lanceolate sepals. The obcordate petals only a little exceed the sepals. The leaflets are 1-3 cm. long, oblong or obovate, with broad teeth. *P. nivea* is distributed throughout the arctic regions and in the higher mountains of the northern hemisphere. In America it ranges from Labrador to Alaska, extending in the Rockies as far south as Colorado.

P. nivea is very variable. The following varieties have been collected in America:

POTENTILLA NIVEA MACROPHYLLA Hook. Bot. Mag. 57: *pl. 2982.*

Leaflets very large and deeply incised; plant taller than the ordinary form.

POTENTILLA NIVEA QUINQUEFOLIA.

P. nivea pentaphylla Lehm. Nov. Stirp. Pug. 9: 69. 1851. Not *P. pentaphylla* Richt.

P. nivea dissecta Wats. Proc. Am. Acad. **8**: 559. 1873. Not *P. dissecta* Pursh, 1814.

Leaves quinate as well as ternate; leaflets deeply toothed, in the quinate leaves the lower ones often smaller.

POTENTILLA NIVEA UNIFLORA (Ledeb.).

Potentilla uniflora Ledeb. Mem. Acad. St. Petersb. 5: 543.

P. nivea Vahliana American authors, at least in part.

The true position of this plant is difficult to determine. It may be placed as a variety of *P. nivea* or of *P. Vahliana* or as a species intermediate between the two. Ledebour made it a variety of *P. villosa*, which it somewhat resembles as to the leaves. It has the caespitose habit, short nearly leafless stems, and short wedge-shaped leaves of *P. Vahliana*. Its flowers are nearly of the same size as those of that species, but the petals are obcordate, not reniform, and the sepals and bracts are those or *P. nivea*, depauperate forms of which grade into it. It is found in the arctic regions from Greenland to Alaska and adjacent Asia, but also in the Rocky Mountains of Colorado. Apparently all specimens labelled *P. nivea Vahliana* from the Rockies belong to *P. nivea uniflora*. It was evidently this form that Watson had in mind when he made the statement that *P. Vahliana* was a depauperate few-flowered form of *P. nivea*.

POTENTILLA VAHLIANA Lehm. Monog. 172. 1820.

P. hirsuta Vahl; Hornem. Fl. Dan. *pl. 1390*. Not Michx.

This is very low and matted, the large flowers a little exceeding the leaves. The petals are very broadly subreniform, *i. e.*, broader than long, and therefore overlap each other; the bractlets are broadly oval, obtuse and about equal the ovate sepals. The whole plant is covered with yellowish villous hairs besides the tomentum. Lehmann was in some doubt whether he should regard it as a variety of *P. nivea* or as a distinct species. He made it a species on the authority of Vahl, who knew the plant in its native haunts. Seeing only *P. nivea* and *P. Vahliana* nobody would hesitate in assigning specific rank to the latter. The trouble comes in when one is to draw the line between either and *P. uniflora*. Lehmann states that *P. Vahliana* was collected by Richardson in

Captain Franklin's journey. Specimens collected by Richardson and named *P. Vahliana* are in the Torrey Herbarium at Columbia, but these, it seems to me, rather belong to *P. uniflora*. There is, however, from the same collector one specimen, a very small one, indeed, which without any doubt belongs to *P. Vahliana*, but this is together with two specimens of *P. nana* under the name *P. nivea arctica*. Except this specimen and one from Herald Island, all specimens seen are from Greenland and the islands of Baffin Bay. They are generally labelled *P. pulchella*. The latter species is easily distinguished by its small flowers, the petals scarcely exceeding the sepals, and its deeply dissected leaves which are pinnate with two approximate pairs of leaflets.

The *Frigidae* differ from the *Niveae* principally in the lack of tomentum. They are all low, more or less caespitose, arctic or alpine plants. To this group belong the following:

POTENTILLA ROBBINSIANA Oakes; Torr. & Gray, Fl. N. Am. 1: 441. 1838, as a synonym under

P. minima Robbinsiana Torr. & Gray, *l. c.*

P. frigida American authors, not Vill.

Torrey and Gray placed this species as a variety under *P. minima* and Watson tranferred it to *P. frigida*. It very much resembles both of those European species. It comes nearest to *P. minima* in habit, but to *P. frigida* in pubescence. It differs from both in the small petals, which about equal the sepals, and in the bracts and the sepals, which are very narrow and subequal. In both *P. frigida* and *P. minima* the petals are longer than the sepals, and these much longer than the bractlets. The same characters that distinguish *P. Robbinsiana* from the two species mentioned distinguish it also from its American relatives. The range of *P. Robbinsiana* is very limited. It apparently is confined to the White Mountains of New Hampshire.

POTENTILLA ELEGANS Schlecht. & Cham. Linnæa, 2: 22. 1827.

This species, as far as I know, has not yet been collected in America, but is mentioned here because it is quite common across Behring Strait and may be found in Alaska. It resembles *P. Robbinsiana* in the sepals and bracts, but is a more delicate plant, the leaflets being only 3–5 mm. long and nearly glabrous.

POTENTILLA EMARGINATA Pursh, Fl. Am. Sept. 1: 353. 1814.

This species was described from specimens collected by Kohlmeister in Labrador. According to Lehmann (Hook. Fl. Bor. Am. 1: 194), *P. nana,* also, was collected by the same missionary. There is therefore a doubt which of the two is the original *P. emarginata.* The latter, as understood by Vahl, Lehmann and others, is a stouter plant than *P. nana,* has very narrow bracts, and leaves with acute teeth, of which the terminal is generally the largest. In both the flowering stems scarcely exceed the leaves. *P. emarginata* grows in Labrador, the Baffin Bay region, Greenland and Spitzbergen.

POTENTILLA NANA Willd. Mag. Gesell. Naturf. Fr. Berl. 7: 296. 1813.

Dr. Watson states that this is a depauperate form of *P. emarginata.* As understood by Lehmann, it is a plant much nearer related to *P. fragiformis.* The habit is caespitose, as in *P. emarginata,* but the teeth of the leaves are rounded and the terminal one generally smaller, and the bractlets are broadly elliptical and enlarge in fruit, as in *P. fragiformis,* from which it differs mainly in size, being in every respect smaller, and in the fact that the flowering stems scarcely exceed the leaves. A connecting link is formed by the Greenland *P. Friesiana,* which resembles *P. nana* in every respect, except that the flowering stems are elongated, as in *P. fragiformis.* Probably all three are but forms of one species. *P. nivea arctica,* at least as to Richardson's plant, must be included in *P. nana.* It ranges through arctic America from Labrador to Alaska, and is also found in eastern Siberia.

POTENTILLA FRAGIFORMIS Willd. Mag. Gesell. Naturf. Fr. Berl. 7: 294. 1813.

Differs from *P. nana* in being in every respect more robust and with stems 1–2 dm. high. It somewhat approaches *P. villosa* in habit, but lacks the tomentum and has much smaller flowers. It comes nearest the Caucasian and Siberian *P. gelida* Meyer, but differs in its hirsute pubescence. *P. fragiformis* is mainly Siberian, but has been collected on the Aleutian Islands.

POTENTILLA FLABELLIFOLIA Hook.; Torr. and Gray. Fl. N. Am. 1: 442. 1838.

P. gelida American authors, not Meyer.

This is near *P. gelida* and has generally been included therein, but differs in its much larger flowers, lighter foliage and a thicker creeping rootstock; it is best to regard it as at least a good variety. If the isolated range is taken in consideration, it is still better to regard it as a species. *P. flabellifolia* is found on the higher mountains of Oregon and Washington, while *P. gelida* grows in the Caucasus and eastern Siberia.

Near *Frigidae* is another group, which may be called *Brevifoliae*, consisting of only two species. It differs from the preceding group mainly in two characters, viz.: pinnately 3–5-foliolate leaves and a very long and slender style, which is fastened a short distance below the apex of the achene. Both species are low, less than 1½ dm. high, from a thickish branched rootstock.

POTENTILLA GRAYI Wats. Proc. Am. Acad. **8**: 560. 1873.

In this species the leaflets are only three, broadly obovate or nearly obicular. The habit of the plant reminds one somewhat of *P. flabellifolia*, but the middle leaflet is considerably stalked, showing that the leaf is pinnate with only one pair, rather than ternate. As the style is of the same form and the same place of attachment as in *P. brevifolia*, it is better to let the two constitute a group by themselves, especially as the habit and flower is nearly the same. *P. Grayi* has been collected only in the mountains around the Yosemite valley, California.

POTENTILLA BREVIFOLIA Nutt.; Torr & Gray, Fl. N. Am. 1: 442.

This species has leaves with about two pairs of rounded 2–3-cleft and crenate leaflets, which are rather small, only ½–1 cm. long. Lehmann included it in the *Glandulosae* on account of the habit, which a little resembles that of the group mentioned, and the fact that the plant is somewhat glandular puberulent. As stated before, the style is very slender, filiform, not basal, but fastened near the apex; the anthers are not flat, and plainly divided into two lobes, and the petals are emarginate. It is confined to the alpine peaks of Oregon.

CONTRIBUTIONS FROM THE HERBARIUM OF
COLUMBIA COLLEGE.—No. 100.

On a New Species of Scrophularia hitherto confounded with S. Marylandica.

BY EUGENE P. BICKNELL.

[Reprinted from THE BULLETIN OF THE TORREY BOTANICAL CLUB, Vol. 23, No. 8, August, 1896.]

On a new Species of Scrophularia hitherto confounded with S. Marylandica.

By Eugene P. Bicknell.

Two totally distinct species of *Scrophularia* are included under the name *Scrophularia Marylandica*, the common Figwort of the Eastern States. The true *S. Marylandica* is a late-flowering plant, beginning to bloom in the neighborhood of New York from the second to the fourth week of July, and continuing to bear flowers into late September or even October. The other species blooms in the spring and early summer—from about the middle of May until late June or early July. Its latest flowers are gone long before the earliest of *S. Marylandica* appear.*

It is not a little remarkable that this very noteworthy difference in the flowering-periods of these common plants should have remained so long undetected, and the fact readily explains why only a single species has been recognized; for, so close is the resemblance between these two figworts that, were their flowering periods identical, their distinctness would scarcely have been suspected. The case affords a striking illustration of extremely close general resemblance between species fundamentally distinct.

That I am not wrong in thus characterizing these plants will, I think, sufficiently appear from a comparison of their roots alone which exhibit notable differences both in morphology and in anatomical structure. It is to be especially remarked, also, that each plant has a characteristic odor distinctly different from that of the other.

It is a matter of curious interest now to recall the long-existing differences of opinion as to whether our *S. Marylandica*, actually embracing two species, was or was not different from the European *S. nodosa*. Of the latter plant I have seen only two incomplete specimens, enough, however, to satisfy me that it is perfectly distinct from both of its East American relatives.

---

* Observations made the present season show that this general rule is not without exceptions. On July 7th, among an abundant growth of the early-flowering species on a shaded northern slope, three belated flowers were found; the same day some plants of *S. Marylandica* which had strayed from the woods into damp open ground showed their first flowers.

I have not overlooked that Pursh ascribed two species of *Scrophularia* to the Eastern States. There cannot be any doubt, however, that his *S. lanceolata* was merely a form of *S. Marylandica*, as authorities have ruled. At first glance the brief description of the former might seem to point to our early-flowering species, but a more careful reading does not allow this view. Not only is no one of the essential characters of this plant defined, but the flowering period given by Pursh—" Aug.–Sep."—is alone conclusive against his *S. lanceolata* being the same as our species which flowers in May and June. Moreover, Pursh's description perfectly accommodates certain narrow-leaved forms of true *S. Marylandica.*

As bearing on this point it may be noted that in the Herbarium of Columbia University is a sheet of true *S. Marylandica*, labeled in Dr. Torrey's hand " *S. lanceolata*, Pursh," followed by the full reference to Pursh's publication. Another sheet of Dr. Torrey's labeled *S. Marylandica* exhibits specimens of both our species.

For the new plant I propose the name *Scrophularia leporella* * in reference to the flower which bears a curious resemblance to a little rabbit sitting upright with ears erect. In the very similar flowers of *S. Marylandica* the same resemblance is seen, but is less striking.

---

* Since this was written Mr. P. A. Rydberg has described a new *Scrophularia* from the Black Hills of South Dakota as *Scrophularia nodosa occidentalis*. (Cont. U. S. Nat. Herb. 3: 517.) Mr. Rydberg, who has seen specimens of my *S. leporella* declares that it is not the same as the Dakota plant, the types of which were large-flowered, and showed a peculiar basal cutting of the leaves something like that seen in *S. Californica.* Certain specimens of *Scrophularia* from Nebraska in the Columbia Herbarium, which Mr. Rydberg regards as referable to his *occidentalis* seem to show a close affinity to *leporella*, and are certainly nearer to it than to *Marylandica.* It is evident from this that the western plant should stand as *Scrophularia occidentalis.* It would be clearly illogical to maintain it as a variety of the European *nodosa*, and, if it should prove to be related varietally to one of our eastern species, that species would almost certainly be *S. leporella*, which would have to take the varietal designation.

SCROPHULARIA MARYLANDICA L.

Erect, mostly 5°–6° tall (3°–10°), large plants becoming widely candelabrate branched above, the branches sometimes reaching an expanse of 5°. Stem glabrous and shining, four-sided with rounded angles and deeply grooved or impressed sides, more or less acutely quadrangular above. Panicles terminal on stem and branches, often somewhat pyramidal, mostly about 1° long (6′–2°) and leafy at the base, glandulose above and in the cymes, the glandules purple, stalked or terminating minute hairs. Cymes racemose, numerous, rather close, widely spreading or ascending, varying from short and contracted to loose and open, 2′–5′ in length and breadth, the peduncles usually much shorter than the branches. Perfectly developed cymes are formed by the forking of the peduncle into two diverging, evenly zig-zag branches bearing at each angle a slender-pedicelled flower, a solitary longer-pedicelled flower rising from the angle of the fork. In many cases the structure is less regular, and more contracted cymes may be irregularly dichotomous. Cymes bracteolate throughout, the bracteoles subtending the pedicels mostly in opposite pairs, linear-subulate, spreading or recurved. Flowers few to many; on the lower cymes rarely less than 9–11 and frequently twice that number. Leaves slender-petioled, deep green, rather thin and veiny, glabrous above (with fine scattered hairs when young) minutely pubescent below (nearly glabrous to softly pubescent) often very large, reaching a length of 1° and a breadth of 6′, mostly ovate-lanceolate from a rounded or sub-cordate base, but varying greatly, from cordate-ovate and acute to lanceolate and acuminate with acute or narrowed base; uppermost leaves often narrowly lanceolate tapering to either end. The leaves vary also from regularly or irregularly serrate or dentate to coarsely doubly dentate-serrate or even sharply dentate lobed. Petioles long and slender, from ⅓ to ¾ the length of the blade, or longer in the lower leaves, becoming gradually shorter in the upper leaves, ciliate-pubescent along the upper side, sometimes glabrate; nodes of the stem between tne petioles often ciliate-fringed. A fascicle of small leaves or a single pair, often quite rudimentary, occupies the axil of each cauline leaf; lowest leaves of the stem large and fully developed, on long petioles. Corolla ventricose-ovoid, puncticulate with pellucid glands, 3″–4″ long, 2″–2½″ wide, little contracted at the throat, the lobes short, the lateral pair and the upper lip usually slightly spreading, the lobes of the upper lip short and rounded; outside of tube green, appearing dull and finely cellular, the interior shining and with the upper lip mostly deep brownish purple; not infrequently the flower is nearly all greenish-yellow. Sterile stamen with its adnate filament deep purple, about ¾″ broad; style filiform, scarcely enlarged at base. Calyx-lobes orbicular to oblong, obtuse, scarcely margined. Flower-buds dull green before expanding. Capsule 2″–3″ long, about 2″ wide, short-ovoid or subglobose, mostly abruptly contracted or rounded to a slender mucronate point, often becoming black. Rarely the capsule is 3, 4 or 5-celled.

Woodland in rich soil, usually about rocky places, sometimes at the borders of thickets in low grounds.

Begins to flower at New York about the middle of July (July 7–28). In some seasons flowers are still to be found at the end of September.

Specimens have been examined from various localities from New York and Ohio to North Carolina, Tennessee and Kansas.

SCROPHULARIA LEPORELLA n. sp.

Lower than *S. Marylandica*, mostly 3°–4° tall (2°–7°), erect, but sometimes inclined from the weight of the fruiting panicle, commonly simple or nearly so, or developing a few ascending slender branches, rarely strongly branched. Stem throughout quadrangular with flat sides and acute margined angles, more or less glandular-puberulent especially when young, becoming glabrate below, viscid-glandular above and throughout the panicle; glandulosity finer and closer than in *Marylandica*, the smaller glandules pale. Panicle commonly longer and narrower than in *Marylandica*, 1°–3° in length, naked or with small leaves subtending the lowest cymes. Cymes commonly fewer-flowered and more contracted than in *Marylandica*, the branches and pedicels less slender and spreading, mostly under 2′ long and broad (1′–3′, rarely longer), ascending, frequently much separated, the branches often not longer than the peduncles, the bracteoles mostly not in pairs or finally recurved as in *Marylandica*, but solitary and somewhat appresed or incurved. Flowers of the cymes mostly 5–7, rarely more than 11, sometimes only 3 in each cyme throughout. Exceptionally, on strongly developed plants, the cyme may be as long-branched and many-flowered as in *Marylandica*, presenting, however, a very distinct appearance from the more ascending branches and pedicels and longer more attenuate capsules. Leaves commonly smaller than in *Marylandica* (largest 10′ x 4′) thicker and less rugose, brighter green, glabrous both sides, somewhat shining below (when young with some minute glandular hairs on the veins above and below) varying from deltoid-ovate through ovate and oblong to lanceolate and narrowly lanceolate, truncate, cordate, rounded or tapering at the base, from finely and evenly to coarsely and irregularly dentate-serrate or sharply cut dentate, sometimes with acuminate and elongated spreading uncinate teeth. Petioles short, from ⅛ to ⅓ the length of the blade, stouter than in *Marylandica*, finely glandular-puberulent, on the upper side short-ciliate. Leaves of the axillary fascicles larger than in *Mary-*

landica, the fascicles sometimes developing into short sterile branches. Lower leaves of the stem reduced or rudimentary, early deciduous, the lowest reduced to appressed scaly bracts. Corolla longer and narrower than in *Marylandica*, more delicately veined but not glandular-puncticulate, more contracted at the throat 4″–5″ long, 2″ broad, the lobes longer than in *Marylandica*, especially the upper one, the two lateral lobes erect or slightly incurved, the lobes of the upper lip often narrowly oblong. Surface of the corolla-tube shining, greenish and purplish, the interior green and dull, the lobes varying from yellowish-green to dull purplish-red, or sometimes a bright pink-red; sterile stamen greenish-yellow, its lobe slightly more adherent than in *Marylandica* and mostly more abruptly dilated to the broadly truncate top which is ½″–1″ wide. Calyx-lobes broadly or narrowly ovate, obtuse or acute, slightly margined. Flower-buds shining, bright green with a purple spot at the top. Capsules ovoid-conic to elongated-conic or attenuate, passing into the thickened base of the style, 2″–5″ long, 1½″–3½″ wide, at maturity slightly compressed and impressed along the sutures, mostly brown, the surface often distinctly reticulate-veined. Seeds a little larger than those of *Marylandica* and darker, otherwise similar—irregularly oblong, often curved, strongly wrinkled striate and pitted. Roots fewer and simpler than in *Marylandica*, much stouter and longer, coalescing basally to form a large irregular woody structure which may be as much as six inches in longer diameter.

Wooded hillsides in rich soil, straying into open ground along roadsides where it sometimes becomes much branched and unusually stoutly developed.

Common near New York City. Dr. Britton finds it common on Staten Island. I have met with it within eight miles of the Connecticut line and in the Pocono region of eastern Pennsylvania. Its further distribution remains to be ascertained.

Begins to flower at New York from before the middle of May to the end of the month. Full sized fruit is already formed early in June, and by the end of the month only a few belated flowers, if any, remain.

Although this species occurs in much the same kind of situations as *S. Marylandica*, the two are rarely found growing together, or even inhabiting the same piece of woods. Near New York are various tracts of woodland inhabited exclusively by one or the other species; twice only have I found them growing together, apparently in accidental association in both cases.

Allusion has been made to differences in the root-structure of these two figworts. These differences are so distinctly marked, even to the unaided eye, that identification may safely rest on a mere glance at a fragment of the fresh root. In *Marylandica* the central cylinder is slender, occupying only about one-third of the diameter of the root; it is hence of about the thickness of the surrounding cortex, from which it is sharply distinguished by its greater whiteness, especially at its tough and lignified outer walls. Upon attempting to break the root the cortex is easily ruptured and peels off smoothly from the central cylinder which bends readily but refuses to break. In *leporella* the central cylinder is of softer texture and much larger, occupying the greater part of the interior of the root; its walls are not lignified, nor is it sharply marked off in color from the surrounding thin layer of cortex, which is not readily disengaged from it. The root is easily snapped in two, showing an even plane of fracture.

A comparison of the flowers of these plants shows a curious reversal of color characters between them. In *Marylandica* the surface of the corolla tube is green and dull, the interior shining and brownish-purple; in *leporella* the outside of the tube is purplish and shining, the interior green and dull. The color of the sterile stamen, deep purple in *Marylandica*, yellowish-green in *leporella* is absolutely constant, that is to say, a reference to hundreds of flowers of each species has discovered no exception. Even in flowers of *Marylandica* which are pale green nearly throughout, the sterile stamen remains purple; conversely, in the most highly colored flowers of *leporella* the green stamen is without the slightest purple tinge.

The early annual shoots of these plants show some interesting comparative differences. Before the end of April the stouter shoots of *leporella* are already a foot or more high, four or five times as tall as those of *Marylandica*. In the former the base of the shoot is leafless, often for several inches, and invested with broad, appressed, overlapping scales or bracts (modified petioles); these show a gradual transition into the small lower leaves. The early leaves have broad, flat petioles, sometimes nearly half an inch wide; the bases of the blades are mostly entire and sharply truncate. In *Marylandica* the lowest pair of leaves are large and fuily developed, on long slender petioles which rise from nearly the extreme base of the shoot.